









A Report On Some Rare, Threatened, Or Endangered Forest-Related Vascular Plants Of The South

Volume I
Isoetaceae through Euphorbiaceae



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A REPORT ON SOME RARE, THREATENED, OR ENDANGERED
FOREST-RELATED VASCULAR PLANTS OF THE SOUTH

Volume I
Isoetaceae through Euphorbiaceae

by

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PREFACE

Several Federal agencies have moved in one way or another to comply with the Endangered Species Act of 1973 (Public Law 95-205, enacted December 28, 1973). The original Act did not provide for plants except to direct that a review of rare United States plants be done by the Smithsonian Institution. Therefore, the Secretary of the Institution initiated a workshop on the subject, held in the fall of 1974. Participants included a number of botanists representing all floristic regions of the United States. This task force reviewed species of vascular plants considered to be, or to become, endangered or threatened, developed a hierarchy of terms for defining degree of endangerment, and arrived at a tentative list. The list, in revised form, appeared as A Report on Endangered and Threatened Plant Species of the United States, January 1974. The Smithsonian Institution published this report in 1975 and presented it to the U. S. Congress in January 1975. Subsequently, this same Report provided the basis for a notice of review of status for the species, published by the U. S. Fish and Wildlife Service in July 1975. The Forest Service of the U. S. Department of Agriculture (USDA), in response both to the language and spirit of the Act, undertook to develop a regional approach to the assessment of rare and endangered plants.

I was approached by Mr. Nathan A. Byrd, Multiple Use Specialist for the USDA Forest Service, Southeastern Area, with the proposal that an evaluation of forest-related vascular plant species be done for the South. This project would be carried out under a Cooperative Agreement between the Forest Service and Vanderbilt University. I was asked to serve as Principal Investigator for the University and Mr. Byrd would act as Coordinator for the Service. In essence, the idea of the project was (1) to develop a list of forest-related species of the South based on the Smithsonian Report, (2) to develop a working bibliography for individual species, (3) to render technical descriptions for each species or taxon, being sure to state how these differ in regard to taxonomic character from similar species, (4) to determine where possible what sort of forest system each species fits into and what are the known threats to continuance of each species, and (5) to detail, where possible, the forest management implications.

Vanderbilt University entered the Agreement in the summer of 1975, and field work was commenced that same year. In 1977, Mr. Byrd turned over his tasks on the project to Dr. Andrew F. Robinson, newly appointed by the Forest Service as an Endangered Species Specialist for the Southeastern Area. Dr. Robinson functioned as coordinator and compiler of my data until 1980, at which time he accepted a position with the U.S. Fish and Wildlife Service.

My own field work and writing up of individual species accounts continued through much of the period between 1975-1981. The bulk of the manuscript was done by 1978. In 1980, 65 writeups appeared as part of a workbook, Endangered and Threatened Species of the Southeastern United States Including Puerto Rico and the Virgin Islands, (USDA Forest Service General Report SA-GR7), compiled by Dr. Robinson. This work, revised that same year, appeared again in 1981, and a nearly complete set of my writeups appeared in 1982 as a supplement, bringing the total of species treated to well over 300. While a substantial number of species remains to be done, this present study, containing 322 taxa, is a significant beginning.

SCOPE, DESIGN, and LIMITATIONS OF THE WORK

A principal goal of the Cooperative Agreement between Vanderbilt University and the Forest Service was a report on forest-related species of the South. Thus the over-300 species treated herein are forest-related in the sense that (a) they are part of some existing forest type and (b) they are part of a system that is in some successional stage leading to a forest formation. In other words, nearly all listed, rare, vascular plants in the South may be considered forest-related, though sometimes in the remotest sense. The term "South" is taken here to include Virginia south to Lake Okeechobee in Florida, west to encompass the forest formations of eastern Texas, inland bounded by eastern Oklahoma, Arkansas, and Kentucky. Thus, 10 full States (Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia) are wholly in it, and parts of three (Florida, Oklahoma, Texas) are represented.

Plant families are listed herein essentially in the order of Engler and Prantl, with genera listed alphabetically within families, species alphabetically within genera.

Each writeup is organized in the following sequence:

1. Family name
2. Technical name (genus, species)
3. Common name (when available). I wish to state emphatically here that I had nothing to do with the selection of common names nor do I know in several cases anyone beyond the Forest Service willing to claim responsibility either for choice or appropriateness. Many common names will not be found, nor will they ever be found, in existing or proposed floras.
4. Technical Description. The technical descriptions are constructed to avoid obscure terminology whenever possible. In some cases they may appear overly lengthy, particularly redundant where several species are described from one genus. The reason for doing it this way is that most writeups are intended to stand on their own, since many writeups for the workbook were distributed to

offices that would not require complete sets; thus, for example, some east Texas workbooks have only Leavenworthia lutea, while middle Tennessee workbooks have several species. The latter workbooks were compiled for distribution based on species appropriate to a given area.

5. Distribution and Flowering Season. Geographic distribution for each taxon is given briefly, followed by a statement of flowering time(s).

6. Special Identifying Features. Remarks are given as to how a particular species is distinguished from others in the same taxon or family.

7. Habitat and Management Implications. Here are notes (based whenever possible on direct field observations) on the habitat of the species, together with what appear to be the threats to that species or to its immediate environment. Comments are often offered on forest management approaches that are least desirable or most desirable.

8. References. A list of references accompanies each species. This list is often partial, sufficing only to allow the reader a source for another description or set of descriptions.

9. Management Practices. This part is in chart form and shows the expected effect on the species of such management practices as prescribed burn, bulldoze or root rake, bedding, chopping, thinning, clearcutting, plantation establishment, grazing. Other practices, particularly those involving the drainage of a site, may also be noted. These comments are almost always estimates, could be very misleading in several cases where they are not backed by hard data, and should be taken only as inferential.

10. Maps. Nearly all the species are mapped by county dots; a few are done simply to show general outline distribution. In either case the distributions are often incomplete, often far from the fact. Botanists working for various Federal and State agencies have added much information that is frequently too new to appear on my maps. Also, a locality becomes historical from the time of collection, particularly now when so much radical landscape alteration is taking place. For an example, a large number of species treated in this work are found in the lower terraces of the Gulf and Atlantic Coastal Plain. Many are species of wet pineland savanna or bog or marsh systems within such areas. Much of the region has been site-prepared for pine plantations, and large areas of what remains are scheduled for such preparation. Thus, even the most recent maps are often unreliable. Quite a few species are locked in to a certain stage of succession so that even without disturbance the habitat is transitory. One might conclude, on the basis of these observations, that several species are more scarce than even my incomplete maps indicate. Our most important challenge is to know the nature and possible universality of a threat to a species, and to amortize this threat.

This work contains no discourse on the philosophy of endangered species. I feel that the only place appropriate for such remarks is in the individual species accounts.

Maps of Zamia integrifolia, Trillium pusillum var. virginianum, Harperocallis, Lilium iridollae, Nolina atopocarpa, Castanea ozarkensis, Polygonella myriophylla, Paronychia chartacea, Rhododendron chapmanii, Gentiana pennelliana and Aster pinifolius were rendered by Dr. Andrew F. Robinson. The rest are my own.

Dr. Robinson and the Forest Service are responsible for the revised language of the Workbook (l.c.) and the Supplement (l.c.), including the primary work of compilation, some mapping, and explanatory and ecological sections. The writing and editing of the individual species accounts are my own. Thus, problems with credit or blame in writing, interpretation of species, accuracies and inaccuracies and inconsistencies are also my own with but one notable exception, namely the choice and publication of common or colloquial names. Not all of the inconsistencies of citation, format, and writing have been picked up in this draft and, for them, mea culpa.

ACKNOWLEDGMENTS

Many people helped me to get the project this far. Sometimes the help came from provision of actual herbarium facilities or information sent in the form of loans or localities. For such aids I am particularly indebted to curators and staffs of herbaria at the University of Alabama, Auburn University, University of Arkansas, Florida State University, University of Florida, University of Georgia, Valdosta State College, University of North Carolina at Chapel Hill, Southern Methodist University, University of Tennessee, U. S. National Museum, Smithsonian Institution, College of William and Mary.

At other times, botanists were willing to accompany me into the field or to share information as to localities of plants, an indispensable aid and a delightful experience. I thank, in order of the States in which they do much field work, Dr. John Freeman, Mrs. Louise Smith, Dr. David Webb, Mr. Richard Davis, Dr. D. Demaree, Dr. Edwin Smith, Dr. Gary Tucker, Mr. Angus Gholson, Dr. R. K. Godfrey (who is all over the map!), Dr. Daniel Ward, Ms. Nancy Coile, Dr. Wilbur Duncan, Dr. Sam Jones, Mr. Raymond Athey, Mr. Max Medley, Dr. W. D. Reese, Dr. S. McDaniel (Mississippi and elsewhere in the South), Dr. Ken Rogers, Mr. Steven Leonard (also all over the South), Mr. David Dumond, Dr. Jim Massey, Dr. Dan Pittillo, Dr. Leo Collins, Dr. Hal SeSelm, Mr. Dennis Horn, Mr. Tom Patrick, Dr. Eugene Wofford, Dr. Doug Rayner, Dr. Donna M. Eggers-Ware, Dr. A. M. Harvill.

Thanks are due the various Heritage and Conservancy programs of several southern States, particularly those of Arkansas, Georgia, Kentucky, Mississippi, South Carolina, staff members of most of which are cited in above acknowledgments. I here apologize for incomplete citations of some of their listed species, in that much of this copy went to print before their own information became available.

At the Smithsonian, Dr. John Wurdack has been consistently interested and helpful, and his insight is greatly appreciated. I can never express fully my appreciation to Dr. R. K. Godfrey, friend and former major professor, for the many taxonomic insights he has provided over the years.

Dr. Ronald Jones provided the kind of steady, careful and productive assistance that did much to produce bibliographic background for the study.

I would like to thank two personnel with the USDA Forest Service for their helpfulness in keeping the work going. First, Mr. Nathan A. Byrd, whose idea this was in the beginning, and whose help both as original Coordinator for the Service and as deviser of the species management guide forms accompanying each writeup is much appreciated. Second, Mr. Robert G. Hitt, Staff Director, Forestry Services Unit, Forest Service, Atlanta, was both helpful and encouraging during a very difficult phase of the project.

Last, but far from least, I must thank my wife, Mabel, without whose cooperation, tolerance and good wishes the project could not have been done at all.

Errors in the work are fully mine, though I hope they do not detract too much from the effort.

Robert Kral

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Asteraceae

Glossary

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ISOETACEAE

> Isoetes louisianensis Thieret [E], Louisiana quillwort.

Technical Description

Grasslike, mostly submersed-aquatic herb from a 2-lobed corm.

Leaves.-- Numerous, arising in tight spirals around the apex of the contracted corm, erect or ascending, 1.5-4.0 dm long (length depending on water depth, the longer-leaved specimens from deeper water), the abruptly dilated bases serving as sporangia, with outer leaves producing megaspores, inner ones producing microspores; blades above sporangia narrowly linear, deep yellow-green, tapering gradually to the apex, proximally flattened at inner face, and thin-margined, toward the apex with backs more convex, or triangular in cross-section, spongy and longitudinally chambered; stomata present; ligule triangular to ovate, 2-3 mm long; peripheral strands 0-28. Sporangia.-- Oblong-elliptic, the thin wall pale, with dots or short lines of red-brown, particularly on the inner face, 6.5-8.0 mm long, 3.0-4.0 mm broad, the inner face covered from 1/3-1/2 by the velum (a membranous outgrowth of the sporangium apex and sides).

Spores.-- Megaspores nearly round, white, irregularly and sharply ridged-reticulate, 0.500-0.625 mm in diameter; microspores brownish, densely and finely spinose, 0.25-0.35 mm in diameter.

Distribution and Phenology

Banks and shallows of clear streams, Washington Parish, Louisiana. Produces spores in May and June.

Special Identifying Features

This extremely rare quillwort is most similar to I. engelmannii var. caroliniana (according to Dr. Thieret, describer of the species) in vegetative character and in nature of megaspores. It differs from that plant by the brown-spotted sporangial walls,

Habitat and Management Implications

I. louisianensis has so far been found only in and along one stream in the Florida parishes of Louisiana. This stream is clear, relatively shallow and swift, and flows through a pine (P. taeda)-bottomland hardwood (mostly Quercus of the willow oak complex) type. There it may be found with its corms shallowly buried in silty sandy substrate, either on banks or bars, or in the stream itself. Thus the plants appear to thrive either submersed or emergent, but obviously require a wet substrate. Logging operations of the sort that would disturb the stream bed or banks would have a disastrous effect on this Isoetes.

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Thieret, J.W. 1973. Isoetes louisianensis (Isoetaceae), a new species from Louisiana. Sida 5 (2): 129.

Reed, C.F. 1965. Isoetes in southeastern United States. Phytologia 12: 369-400.

SPECIES Isoetes louisianensis Thieret

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA			NA	X
Damage						X		
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments: grazing stock would trample banks and disturb stream bottom!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Isoetes louisianensis Thieret



245
OPHIOGLOSSACEAE²)

→ *Ophioglossum palmatum* L. ^{E-1} hand-adder's-tongue fern
~~*Cheiroglossa palmata* (L.) Presl~~

Technical Description

Epiphytic perennial fern from a round-tuberous rhizome, the rhizome surface covered by a wooly chaff of narrow scales, the roots fleshy, containing endophytic fungus.

Fronds.-- Glabrous, usually 2 or 3 from the rhizome, the "petiole" fleshy but flattened, narrowly strap-like, dilating distally into a pendulous, hand-like, similarly fleshy but flat blade, this broad, 1-4 dm long (nearly as wide or wider), dissected into 2-9, oblong or broadly linear, erect or flabellately spreading lobes, these narrowed acutely, acuminate or rounded, truncate or even retuse, and varied in length (rarely undivided as in the "normal" adders - tongue species), often reminiscent of *Laminaria* type kelp, the frond base attenuated to the stalk, the venation areolate (anastomosing, closed); fertile segments (1-) 2-many (-16) arising from the upper rachis or from the blade base, the massive, rounded sporangia many in 2 continuous rows in linear spikes, these mostly linear-oblong, 2.5-5.0 cm long, on narrower ascending stalks as long as the spikes or longer.

Distribution and Spring Season

Epiphytic, in the "wickerwork" of old petiolar bases of cabbage palm, moist rich hammocks, peninsular Florida; producing spores all year.

Special Identifying Features

The family Ophioglossaceae is distinguished from other ferns by a combination of tuberous rhizome, sporangia massive, in spikes or panicle-like clusters from stipe or leaf. Two genera are native. *Ophioglossum* is distinguished by the anastomosing (closed) frond venation, the simple or less-dissected leaf, the sporangia borne in spikes (in *Botrychium* the usually more dissected frond has open venation, the sporangia are produced in branched (panicled) systems). All other *Ophioglossum* in North America have vegetative leaves simple, unlobed, and are smaller plants than *O. palmatum*, which is also distinguished by its unique ecological niche and exclusively epiphytic habit.

Habitat and Management Implications

O. palmatum almost invariably is found on *Sabal palmetto*, is commonly associated with various Bromeliaceae, ferns such as *Polypodium aureum*, *Vittaria lineata*. However, the *Ophioglossum* has a unique niche on the palm in that its fleshy, fuzzy rhizome is imbedded in the detritus that collects within the large persistent petiole bases of the palm. The stipes of the frond grow upward and out from behind the palm petiole bases, protruding and bending downward apically, thus the "hand-like" blade droops. The plants are most abundant in the moister hammocks, thus are more abundant where there is often shallow standing or flowing water a good part of the year, less abundant

on palms of hammock edges or in open or dryer hammock. Since the "wickerwork" of palm petiole bases ultimately breaks away from the bole, the fern falls with these old petioles and dies. Thus, the greatest threat to this once (according to Small) abundant fern comes with fire which, while it may not kill the palm, will burn away the old leaf bases which are the habitat of the fern. Since most of the original cabbage palm hammock of Florida has been burned severely at least once, protection of what is left of this habitat is mandatory. Some hammocks are still being burned to "open" up area for livestock. Other hammock habitat has been lost through drainage and subsequent industrial and/or residential development; still more has been drained for conversion to Citrus culture.

References

Small, J.K. 1938. Ferns of the southeastern states, pp. 346-379. Lancaster, Pa.

SPECIES Ophioglossum palmatum L. Hand adder's-tongue fern

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X	X	
Damage					X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: Burning over of cabbage palm hammock has destroyed this species over much of its range.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Ophioglossum palmatum L.



145
HYMENOPHYLLACEAE:)

100
→ Hymenophyllum tunbridgense (L.) Smith [1-3] ~~tunbridge fern~~
Trichomanes tunbridgense L.

Technical Description

Perennial, delicate, smooth, low fern, creeping by filiform, terete, smooth rhizomes, forming dense mats.

Fronds.-- Erect, produced at frequent intervals along the elongate rhizomes, actually drooping from the usually vertical substrate, no longer than 5 cm; stipe (petiole) mostly 1-2 cm long, smooth, terete, dark brown, minutely longitudinally striate; blade simple to 2-pinnate, 1 cell layer thick save for brown mid-nerve, in outline lance-ovate or oblong, 1-2 cm wide, the pinnae mostly 4-6 per side, slightly ascending, in outline cuneate to ob-ovate, asymmetrical, deeply divided into linear or oblong ultimate segments these ascending and somewhat spreading fanlike on the upper side of each pinna, marginally spinulose-serrulate, apically rounded or blunt; mid-vein of blade winged to about the width of the ultimate segments the veins simple, forking only into ultimate segments of their tips; sori enclosed in a cuplike, bi-lobed, obovoid, apically denticulate involucre (modified ultimate segment) ca. 1.0-1.2 mm long at tip of a lower vein of the lowermost pinnule of a pinna, the sporangia in a single cluster, concealed within, borne on a bristle.

Distribution

Moist ledges, caves, ravines in full shade, in North America found only in one ravine in Pickens County, South Carolina; essentially tropical in the New World, in the Old World and Asia extending north to Norway and Japan.

Special Identifying Features

H. tunbridgense in the southeastern area is most similar to Trichomanes, of the same fern family. Trichomanes may be distinguished by its funnel formortubular involucre, their tips not toothed, the bristly bearing the sporangia projecting beyond the tip of the involucre (rather than concealed within).

Habitat and Managment Implications

This fern grows only in one humid ravine, this a steep-sided streamcut through metamorphosed granite. It is in deep shade of mixed hardwoods, hemlock and white pine, with an understory of Rhododendron maximum and Kalmia. It forms mats of pendant fronds on shaded ledges and surfaces of the rock along the ravine base which slopes, sometimes sheerly, into a swift, cold, rock-bedded stream. The atmosphere is often charged with mist from the stream, probably is saturated most of the time, thus the habitat is highly humid, the substrate almost constantly moist, always shaded. It is obvious that continuance of this rare fern depends on maintenance of the streambank and the stream and absolutely no admittance of light such as would occur with any sort of logging.

References

- Radford, A.E. Ahles, H.E. and C.R. Bell, 1968. Manual of the vascular flora of the Carolinas, pp. 14-15. Chapel Hill, N.C.
- Copeland, E.B. 1947. Genera filicum. Chronica Botanica Co., Waltham, N.Y.

SPECIES Hymenophyllum tunbridgense (L.) Smith. Tunbridge fern

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA	X	X	NA	?
Damage								
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: logging of any sort would be detrimental!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Hymenophyllum tunbridgense (L.) Smith



245
ASPIDIACEAE!

- Thelypteris pilosa (Mart. & Gal.) ~~Crawford~~ var.
alabamensis Crawford. Streak-sorus Fern
Gymnogramma pilosa Mart. & Gal.
Dryopteris pilosa (Mart. & Gal.) C. Chr.
Lastrea pilosa (Mart. & Gal.) Copeland
Leptogramma pilosa (Mart. & Gal.) Underwood var.
alabamensis (Crawford) Wherry

Technical Description

Rather delicate, lowish fern from a slender, short, yellow-pilous and reddish-brown-scaley rhizome, the rhizome scales reddish-brown, lustrous, scattered pilous toward base, 1 cm or less long, lanceolate, attenuate.

Fronds.-- Close-set on the short rhizome, usually appearing clustered, the stipe slender, erect to ascending or spreading, brownish toward base, upwardly becoming green, slightly angulate, pilose throughout, 1-3 (4-8) cm long; blade 3.5-10.0 (-15) cm long, 1.5-3.0 cm broad, ovate-lanceolate to lance-or-elliptic-oblong, usually broadest at middle or below, 1-pinnate, the lower pinnae separate, short-stalked, narrowly to broadly ovate, elliptic or suborbicular, rounded-tipped, entire to sinuate or sinuately toothed or lobed, upward becoming sessile, then fused basally so that toward tip the frond is pennately lobed, at very tip shallowly lobed or serrate-dentate; upper surface of blade yellow-green, dull, scattered strigose-pilose, densely so along the veins and midrib; lower surface of blade slightly paler, similarly pilose; venation of pinnae pinnate, a central vein extending to pinna-tip, laterals to each lobe (tooth) tip as well as to each sinus; sori short to elongate-linear, the sporangia rather loosely and medially arranged along the branch veins of the pinnae.

Distribution

Shaded bluffs along the West Fork of the Sipsey River, Bankhead National Forest, Winston County, Alabama; also Chihuahua, Mexico.

Special Identifying Features

This species differs from the other Thelypteris of the southeast in having no indusium. It differs from T. pilosa var. pilosa, a widespread species in Mexico and Central America in being an overall smaller plant, the pinnule tips rounded (rather than acute!), the sinuses of pinnule margins reached by but 1 lateral vein (rather than by 2).

Habitat and Management Implications

T. pilosa var. alabamensis grows on shaded moist ledges of Pottsville Sandstone which forms massive bluffs in places along the Sipsey River. For several years it was presumed extinct in that it had been known only from the type locality 5 mi. east of Double Springs on the Sipsey and this locality had been destroyed by bridge construction. Recently however, it has been found in a few, isolated localities along the same stream, the populations generally small, consisting of few plants each. In that the area where the ferns have been found is in National Forest and the river itself

is there protected, this fern, because of its small size, because of the steepness of its habitat, should escape much damage save by overactive collectors of ferns. These plants are usually much smaller than dimensions given them by Wherry (1964), usually are scattered in moss and liverwort mats in the crevices of the bluffs. Shade is provided by a bluff and ravine forest of hemlock, various cove-type hardwoods including Quercus rubra, Q. alba, ash, tulip poplar, elm, maple. Betula lenta, etc. Habitat for this rare fern is maintained by a combination of high humidity, high substrate moisture, and shade, the humidity provided by evaporation from the stream, the substrate moisture by seepage over the sandstone and bryophyte mats, the shade by overhanging branches of trees which also tend to trap the moist air. Danger to the fern could come from logging of the bluff woodlands, this admitting too much light, reducing humidity, thus generally contributing to a drying out and destruction of the habitat.

References

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- Crawford, L.C. 1951. A new fern for the United States. Amer. Fern. Journ. 41: 15-20.
- Dean, Blanche E. 1969. Ferns of Alabama, rev. ed. pp. 105-106. Southern University Press.
- Knobloch, I.W. and D.S. Correll. 1962. Ferns and fern allies of Chihuahua, Mexico. Renner, Texas.
- Wherry, E.T. 1964. The southern fern guide, p. 86. New York.

SPECIES Thelypteris pilosa (Mart. & Gal.) Crawford var.

alabamensis Crawford. streak-sorus fern

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA	x	x	NA	NA
Damage								
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Thelypteris pilosa (Mart. & Gal.) Crawford
var. alabamensis Crawford



245
ASPLENIACEAE:

→ Phyllitis scolopendrium (L.) Newm. ~~European~~ American hart's-tongue fern
Scolopendrium vulgare Sm.
Phyllitis scolopendrium var. americana Fern

Technical Description

Perennial, evergreen fern from a shortish, stout, ascending caudex-like rhizome.

Fronds.-- Few to several, closely and spirally clustered at rhizomal crown, simple-bladed, the blades spreading or ascending in a rosette, strap-like (oblong-linear to linear-panduriform), mostly 1-3 dm long, mostly 2-5 cm wide, apically short-acuminate, acute or rounded, rarely bifurcated, in any case the tips bluntish, the margin thin, somewhat revolute, entire or sinuate, the fresh surface pocketed-crispate, the blade base usually prominently auriculate; surface above a glossy deep green, beneath paler, duller; veins pinnate, few-forking, free, their tips enlarged to form linear "foveolae" (visible on upper surface) extending to ca. 1 mm from margin; stipe dark glossy brown, stoutly linear, between 1/3 and 1/4 as long as the blade, with a brush of reddish-brown, narrowly-triangular-attenuate scales, these longest and most abundant at stipe base, reduced in size and patchy upward, denser again on the lower surface of the frond along base of midrib of blade, sometimes to near its apex; sori linear, double but each pair so close as to appear one, the "pairs" regularly and pinnately arranged from near blade base to near summit or on the distal 1/2-1/3, mostly 0.5-1.5 cm long, shorter often alternating with longer; indusia pale-membranous, lateral to each of a sorus "pair", 1 flap usually slightly overlapping the other over the crest of the compound sorus.

Distribution

Cool, moist to dryish shaded faces of calcareous rock or shade, in North America very rare and local from New Brunswick and Ontario southward to central New York state; in the southeastern area known now only from Marion County, Tennessee, Northern Alabama and Mexico.

Special Identifying Features

P. scolopendrium is monotypic, perhaps may be distinct as a variety of the more abundant European entity (this infrequently naturalized in eastern North America), which tends to be in all ways a larger plant with scales of stipe more uniformly disposed along the stipe, the larger ones admixed with smaller, narrower ones, and with longer, broader sori. Unlike the American example, the European plants are said to be abundant in many parts of Europe, almost weedy, on rock fences, in rocky pastures and hedgerows.

Habitat and Management Implications

At one time there were only 2 known stations for the hart's-tongue fern in the southeast, both in Tennessee, in Marion and Roane counties, the latter

now destroyed. In that the only recent observations of it have been made in the Marion County locality, a limesink and falls near South Pittsburg, the following habitat observations are confined to the writer's experience with that locality. The Phyllitis juts from the steep sides and overhang of a narrow deep sinkhole in limestone. The substrate is almost always moist, is often wet, covered with a mat of bryophytes, and is usually both shaded and cool, consisting either of rockface or the sticky clay weathered from it. The visible sporophytes are usually few, most of them now confined to the most inaccessible part of the sinkhole, namely the lower part of and overhang adjacent to the lip of a waterfall. Fortunately for the fern the only way a collector could reach the few plants would be by his being lowered by rope or rope ladder. There are several previous reports of this South Pittsburg population, beginning with the late 1800's and the earliest indicate that it was then much more abundant, extending even to the floor of the sink. Since then, reported numbers of sporophytes have varied widely, but in general show a decline. None are now seen on the sink floor or toward its rim. Complicating matters still further is the fact that Mr. E.W. Graves (according to Ms. Eleanor McGilliard, 1936) spread spores of Ontario plants in the area so that at least some of the specimens now seen may have developed from that source. However, the hart's-tongue fern still exists in one southeastern locality. It is maintained there by the unique habitat which provides a combination of shade of mixed hardwoods, high and nearly constant moisture of substrate, and high humidity created by the spray from falling and seeping water. There is relatively little fluctuation of the cool temperature in summer. This habitat is so sensitive that any type of human activity in the immediate area involving mining or logging machinery would doubtless trip the balance toward extirpation.

References

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- Graves, E.W. 1911. The hart's-tongue in Tennessee, 1878-1935. Amer. Fern Jour. 26 (4): 113-122.
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- Shaver, J.M. 1954. Ferns of Tennessee, pp. 105-112. Nashville, TN
- Small, J.K. 1938. Ferns of the southeastern United States, pp. 148-150. New York.

SPECIES Phyllitis scolopendrium (L.) Newm. American hart's-tongue

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA	X	X		
Damage								
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: known localities should be "insulated" by a wide totally protected zone!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Phyllitis scolopendrium (L.) Newm.



245
CYCADACEAE!

> Zamia integrifolia Ait. [-2] Florida coontie

Z. floridana DC.

Palmifolium integrifolium O. Ktze.

Technical Description

The plants fernlike.

Stems.--The short crown developing from a tuberous-thickened, usually erect underground stem the size and shape of a large sweetpotato which, toward its pointed base, puts out thickish roots and, at its apex, the wooly crown, most of which is covered by old, flattened, wooly and hairy leaf bases, together with narrowly triangular scales.

Leaves.--Foliage leaves are uncoiling as are those of ferns, mostly 5-8 dm long, evergreen, the brownish rachis ascending, hairy toward its base, stiffish, the inside flattish or concave, the lower side convex, sometimes angled, the blade pinnate, occupying a half or more the total length, of many pairs of leathery leaflets, these arranged to form a broad or narrow "V"; leaflets linear, mostly 7-10 (-14) cm long, evenly parallel-veined (the veins are most evident on lower surfaces), obtuse, the margins revolute and entire, the surfaces smooth, the upper a dark, lustrous yellow-green, the lower somewhat paler.

Cones.--Male and female cones produced on separate plants, from the center of the crown, erect on stout, fuzzy-hairy stalks. Male cone in "bloom" cylindrical or lance-ovoid, 5-8 cm long, the cone-scales (sporophylls) attached peltately (like thumbtacks) in vertical, close-fitting rows much as are kernels of corn on the cob, the exposed outer surfaces of the scales hexagonal, cinnamon-brown, minutely fuzzy, each bearing beneath, along the scale axis, several yellowish sporangia. Female cones larger, stouter, on stouter stalks, mostly short-cylindrical, the scales much like the male in structure and pubescence, but bearing fewer and larger sporangia (ovules). Male cones not persisting long after pollen shed. Female cones persisting, expanding as the enlarging, orangish, fleshy coated ovules ripen and push the cone scales apart. Mature seed with outer coat fleshy, orange-red, mostly between 1.5 and 2.0 cm long, the tips rounded, the seed body somewhat prismatic.

Distribution and Flowering Season

Dry, sandy pine-lands, pine-palmetto flatwoods, sand ridges, hammocks and kitchenmiddens (oystermounds), from the keys northward through the peninsula into northwestern Florida along the Suwannee. Cones may be produced all year, but heaviest in late winter and early spring.

Special Identifying Features

The taxonomy of these species is somewhat confused. Small (1933) treated three species in addition to Z. integrifolia. Z. angustifolia Jacq. is considered by some a synonym of Z. integrifolia. Long and Lakela treat the other two (Z. silvicola Small, Z. umbrosa Small) as Z. pumila L. Most of the characters

used to distinguish species have to do with the leaves. In Z. pumila, the leaflets have lower length-width ratios, more veins, and the plants are on the average lower.

Habitats and Management Implication

The original distribution of Z. integrifolia is difficult to determine. The underground, potato-like stem is filled with starch, and the Indians extracted this as a flour for their bread. It is believed, therefore, that the Seminoles and their predecessors carried the plants about with them. This idea is reinforced by the abundance of Zamia on and around kitchenmiddens and old Indian campsites and settlement locations.

Zamia plants are usually rooted in moist, well drained, sandy loam or sands, these areas either in rather dense, low, hardwood-cabbage palm hammocks over limestone, in high, hardwood hammocks (again, over limestone or amidst outcrops of it), on sand ridges forested with longleaf pine-deciduous hardwood, sand ridges with sand pine-evergreen scrub, or even in expanses of slash pine-saw palmetto flatwoods. Their thick, underground stems make them fairly resistant even to hot fires. In that they thrive with or without shade, various logging practices have little effect on them, providing this is not followed by wholesale site preparation involving drastic soil disturbance which exposes or chops up the underground parts.

The greatest threat now posed against "Conti Hateka" is a combination of wholesale site preparation by pine monoculturists, similar preparation for large housing and recreational developments, or large-scale digging up of the plants by nursery people.

Suggested Reading

Long, R. W. and O. Lakela. 1971. A flora of tropical Florida, pp. 108-111.

Small, J. K. 1933. Manual of the southeastern flora, pp. 1-2.

Revised March 1980

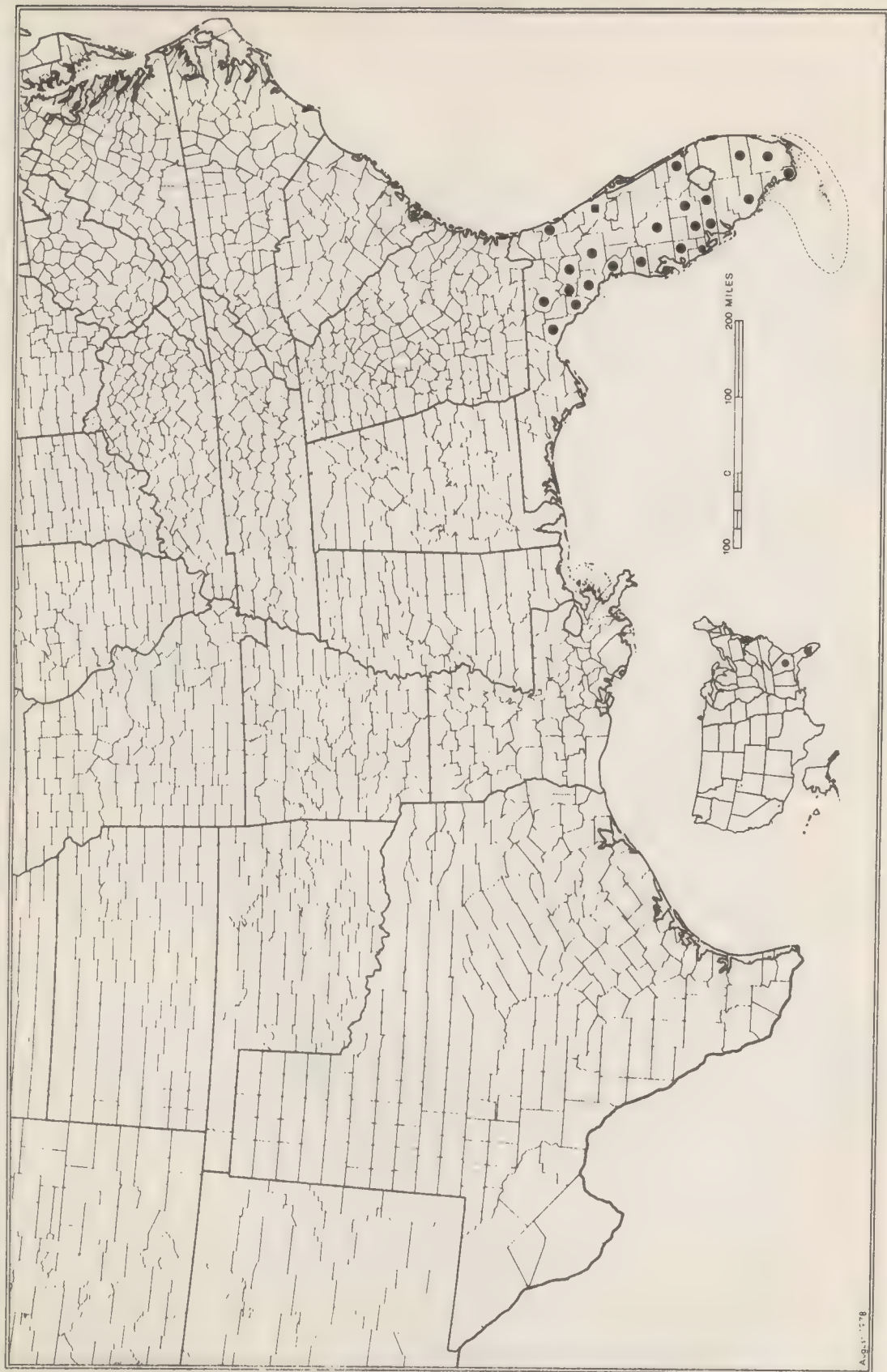
SPECIES: #52 Zamia integrifolia Ait.; Florida coontie

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy		X		X				
Damage			X			X		
No lasting effect								
Beneficial if done properly	X				X			

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980



MAP. 52. *ZAMIA INTEGRIFOLIA*

245
TAXACEAE

→ Taxus floridana Chapm. ~~Florida yew~~

Technical Description

Faintly but pleasantly aromatic, broad-and-flattish-crowned, smooth, mostly dioecious shrub or small tree at most to 8 meters tall, the trunk usually leaning, usually asymmetrical, the bark thin, purplish-brown or gray-brown, separating into small plates.

Branchlets.-- Slender, often spreading, the newest growth pale green, covered with the flattened, spiralled, adherent sterigma bases, these later turning brownish or reddish-purple as the bark forms.

Leaves.-- Spirally arranged but twisted on the "petiole" so as to form flattened sprays or a broad "v" trough, linear, mostly 1.0-2.5 cm long, soft, ca. 2 mm broad, short-acuminate to a sharp but weak point, entire and concavely revolute, the upper surface a deep, lustrous green, the lower surface much paler, yellow-green, with 2 strong stomatiferous bands one on each side of the raised midrib, the blade narrowing to an ascending or erect, petiole-like constriction ca. 1 mm long, this articulated to the decurrent, flattened sterigma base.

Male Reproductive Structure.-- Male cones subglobose, yellowish roundish, ca. 3 mm broad, projecting on short, erect stalks slightly beyond the tips of acuminate tips of axillary, imbricate-scaley "flower buds", the sporangia borne under heads of tack-like sporophylls, these produced in a few whorls in each cone.

Female Reproductive Structure.-- Ovules erect, solitary, each enclosed in a small, imbricate-scaley, pale green axillary bud (which much resembles an ordinary shoot bud), with only the micropylar end of the aril protruding. Ripe oval ovoid or obovoid, ca. 5-7 mm long, in a globular fleshy, red aril cup nearly 1 cm broad.

Distribution and Flowering Time

Understory to mesic (or swamp) forest species in steep ravines (rarely swamps) mostly along the east bank of the Apalachicola River in Gadsden and Liberty Counties, Florida (also in a Chamaecyparis swamp ca. 8 mi. southeast of Bristol). Pollen shed and received during March.

Special Identifying Features

T. floridana is unlike any other gymnosperm within its small range, its nearest eastern North American relative being T. canadensis, a lower species of the north and northeast, locally into the southern Appalachians but still removed in range several hundred miles. In some ways it superficially resembles Torreya, but has shorter, narrower, softer foliage and a much different aril character (for details consult information under Torreya taxifolia!)

Habitat and Management Implications

T. floridana is usually in the same habitat as Torreya taxifolia (which see!), though, as noted above, it has one anomalous habitat. It is a shade requiring species so that logging disturbance of the overstory would create a much drier, sunnier, warmer site than it or its reproduction would tolerate. The largest numbers of this rare species are now found within the boundaries of Torreya State Park. Outside the Park, on private lands, the main danger faced by the species is from excessive cutting of overstory species of pine and hardwood, this admitting too much light and heat and also accelerating soil erosion on the steeper sites.

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- Nuttall, T. North American Sylva III: 92.
- Sargent, C.S. 1921. Trees of North America, Dover Press ed., pp. 95-95.
- Small, J.K. 1933. Manual of the southeastern flora, p. 12. Chapel Hill.

SPECIES Taxus floridana Nutt. Florida yew

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X		
Damage					X			*
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: Taxus is one of the most deadly stock poisons!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Taxus floridana Chapman



245
TAXACEAE

Torreya taxifolia Arn. ~~Florida torreyi~~
Tumion taxifolium (Arn.) Greene

Technical Description

Small, dioecious tree (formerly to ca. 18 meters tall, 6 dm dbh), usually with but a single, evenly tapering bole, the bark thin, grayish or gray-brown, braided and shredding cedar-like, the inner bark orangish, the fresh-cut wood unpleasantly pungent. Crown broadly pyramidal, the main branches whorled, spreading or slightly declined, the ultimate branching plane, stiff. Branchlets smooth, arising mostly oppositely from scaley shoot buds developing from swollen branch tips and branch nodes, green, smooth, narrowly grooved between the elongate, flattened, spirally arranged sterigma bases.

Leaves.-- Evergreen, smooth, persistent 3-4 years, spirally arranged but by a "petiolar" twist appearing distichous (in 1 plane) much as in the yews, rigid, lance-linear, 2-4 cm long, ca. 3-4 mm broad, rigidly subulate-tipped, concavely revolute, narrowed at base to a petiole-like constriction ca. 1 mm long which includes the "joint" connecting it to the jutting sterigma apex which in turn flares to a flattened sterigma base adherent to the branchlet; upper leaf surface a dark lustrous green; lower leaf surface dull pale green with a broad pale stomatiferous band on either side of the raised midrib.

Male Reproductive Structure.-- Microsporangia clustered, pendulous on sporangiophores clustered in round, small, yellowish cones ca. 5 mm long, on stiffly spreading stalks from tips of stramineous ovoid, imbricate-scaley axillary buds.

Female Reproductive Structure.-- Ovules arising singly and terminally from imbricate axillary buds, erect, nearly sessile, only the micropyle projecting from the enfolding bud scale tips; ripe ovule in size and shape comparable to a green olive, ellipsoidal, smooth, 3-4 cm long, green and glaucous, later turning purple, the aril (fleshy covering of seed) fleshy, later leathery, somewhat thin, the seed coat within woody.

Distribution and Anthesis

Rich wooded slopes or rises in calcareous bottoms, Apalachicola River basin, northwestern Florida and southwestern contiguous Georgia with a presently known range including but 3 counties in Florida, 1 in Georgia. Shedding and receiving pollen in March and April.

Special Identifying Features

This small tree, whose nearest relative is Torreya californica, a species confined to the western slopes of the Sierra Nevada and coast ranges of California, bears no resemblance to any other southeastern area gymnosperm unless it be Taxus floridana, a species of yew with a similar habitat and range. The yew differs in having a lower, more spreading crown, shorter,

softer leaves, and a much smaller ovule surrounded by a fleshy, cuplike, bright red aril.

Habitat and Management Implications

T. taxifolia grows as understory in rich hardwood hammock forest. The soil is a rich, dark, moist sandy loam, the best stands once on steep sides of ravines at and below Chattahoochee southward to Bristol along the east side of the Apalachicola River. Overstory species include *Magnolia grandiflora*, several species of *Quercus* (particularly *Q. alba*, *Q. nigra*, *Q. shumardii*, *Q. falcata*, *Q. hemisphaerica*), *Carya*, *Fraxinus*, *Acer saccharum* subspecies, *Acer rubrum*, *Pinus glabra*, *P. taeda*, etc. Associated understory species include *Cornus florida*, *Cercis*, *Magnolia pyramidata*, *M. ashei*, *Persea*, *Myrica*, etc. Clearcutting of the hardwoods and pine, some of which are large and valuable has in the past had an adverse effect on the *Torreya* trees which are intolerant of much light. One of the best areas for the trees was Torreya State Park where the main danger to them (as in other areas) was once the rampant rooting up of seedlings and young specimens by uncontrolled numbers of wild hogs. This trouble could have been overcome, but in the early 1960's the trees throughout their small range were attacked by a root rot organism which destroyed all of the larger specimens. Today there are but few survivors, these, in the main, widely scattered young trees or suckers from root systems of older individuals. The prognosis for this species in the wild is bad. There are a few large specimens still undamaged in cultivation in botanical gardens or nurseries from which cuttings are occasionally rooted but moving of these back to original localities will be difficult.

References

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SPECIES Torreya taxifolia Arn. Florida torreya

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X		
Damage					X			
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Torreya taxifolia Arn.



45
ALISMATACEAE

→ Sagittaria fasciculata E. O. Beal ~~launched arrowhead~~
S. graminea Michx. var. macrocarpa (J.G. Sm.) Bogin

Technical Description

Perennial, rosulate, smooth aquatic herbs, clonalizing by slender, pale, elongate, stoloniferous rhizomes.

Leaves.-- All basal, in flat spirals on a short, soft stem, with two extreme sorts produced; phyllodes appearing first in season, short-linear or slightly gladiate, erect or somewhat spreading, succulently stiff, arenchymatous (spongy-tissued), mostly 5-10 cm long, 0.7-2.0 cm wide, bluntly acute with the very tip callused, the margin entire, the surface evidently strongly multi-parallel-nerved with cross-partitions evident, toward the strongly clasping base pale, upwardly becoming a deep but bright green; leaves later in season progressively elongating to 15-35 cm, becoming lorate (still broadly linear toward base but dilating apically) or with elongate, broadly linear, flat petioles and elliptic to lanceolate blades, these frequently 1.5-3.5 (-4.0) cm wide and 1/3-1/4 as long as the petioles.

Inflorescence.-- Verticillate raceme, 1-several scapes arising from the rosette, erect, emergent, teretish, lineal-tapering, mostly 15-35 cm tall, the 2-3 (-4) verticels arising toward the scape tip, the lowest producing female flowers, the upper ones male, the slender pedicels spreading or ascending, usually 3-5/whorl, with female ones longest, to 3 or 4 cm long, each verticel subtended by 3 ovate, papery bracts ca. 4-5 mm long, boat-shaped, spreading-ascending, joined at base into a cup.

Flowers.-- Regular, unisexual; sepals 3, ovate, distinct, in the female somewhat longer (3.5-4.0 mm long) and spreading or reflexed in fruit, thin, pale green with pale, scarious borders sometimes tinged with pink; petals 3, distinct, spreading, obovate, white, ca. 4 mm long; stamens numerous, the broad, flattish filaments ca. 0.3-0.4 mm long, glandular-short-puberulent, the oblong, yellowish anthers erect, ca. 0.8-1.0 mm long; carpels numerous, distinct on an elevated receptacle.

Fruit.-- Akene somewhat laterally compressed, asymmetrically wedge-shaped, ca. 4 mm long, the oblong seed cavity longitudinally lined with prominent, reddish, resinous ridges, and surrounded by a broad thin pale wing, the persistent style projecting laterally as a winged "spur" to 1 mm long.

Distribution and Flowering Season.

Seeps, bogs and swamps, Blue Ridge and southern Blue Ridge escarpment, southwestern North Carolina and northwestern South Carolina; flowering in May, June.

Special Identifying Features.

This non-sagittate-leaved Sagittaria is distinguished from the others of its complex in the southeast (S. rigida, S. teres, S. platyphylla, S. graminea, S. isoetiformis) by a combination of flattened phyllodia, blades of emergent leaves relatively broad but at the same time female pedicels not recurved

(eliminating S. platyphylla), the anther definitely longer than the filament, and the bracts strongly fused.

Habitat and Management Implications

S. fasciculata is presently known from but two counties in North Carolina, one in South Carolina. It is always rooted in shallow water over siliceous and micaceous silty muck in freshwater swamps or bogs in or along shallow languid streams that course through such areas. It may be in full sun or full shade, in the latter case being under Red maple, Nyssa, Alder, Willow, Viburnum, Ilex, Aronia, Rosa. These seep swamps and bogs, often odorous with sulfides, are usually comparatively narrow zones in rises or hills forested by a mixture of hardwoods and pines (both hard and soft). The greatest present threat to the Sagittaria is a compound of such activity as drainage for industrial development, work along highway and railroad rights of way; much of its known habitat has been destroyed in this way. The sensitive habitat may also be threatened by excessive logging of the slopes draining into such bogs, with erosion and subsequent washing of sediments into the areas, thus burying the plants or effecting their supply of water.

References

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- Wooten, Jean W. 1973. Taxonomy of seven species of Sagittaria from eastern North America. Brittonia 25 (1): 64-74.

SPECIES Sagittaria fasciculata E. O. Beal. bunched arrowhead

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	x	x	x		x	NA	?
Damage								
No Lasting Effect					x			
Beneficial if Done Properly								

Other Comments: Site drainage or damming would destroy plants!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sagittaria fasciculata E. O. Beal



Sagittaria secundifolia Kral [2]

Technical Description

Submersed aquatic from a stiff, elongated (to 1 dm) rhizome.

Leaves.--Phyllodial, of two kinds, those of swift shallows secund along rhizome, blades linear, erect to ascending, falciform (2-) 5-8 (-10) cm long, 2-5 mm wide, rigid, fleshy though flattened, deep green, the tips acute but at very apex with a small concave callused area, the inner (ventral) margin joined in the blade and thus thickest; phyllodes of quiet or less rapid waters linear-subulate, erect to widely ascending (5-) 10-30 cm long, medially terete, distally triangular or angulate or lingulate; sheaths broad, pale variously imbricated.

Scapes.--Erect, 1-4 (-5) dm tall, terete but multicostate, flowering only toward the apex.

Inflorescence.--Verticels (1-) 2-4 (-5), the lower 1-2 female; bracts 3, basally connate, ca. 4 mm long, the lobes ca. 3 mm long, triangular, acuminate, smooth, indistinctly nerved; pedicels 3 per node, slender but rigid, widely ascending, accrescent, (1.0-) 1.5-2.5 (-3.0) cm long.

Flowers.--Regular, unisexual. Sepals 3, scarious, smooth, triangular-ovate, apically narrowly obtuse, 4-5 mm long, after anthesis reflexed or spreading, finely multinerved, yellow-green. Petals reduced or none in the female; petals of male flowers 3, white, 1.0-1.5 cm long. Stamens 9-12, filaments conic, fleshy, 1.0-1.3 mm long, basally green, white-tomentulose, apically short-subulate; anthers oblong, yellowish, about equal to filaments.

Fruit.--Fruiting pedicels erect or spreading. Akenes ca. 2 mm long, asymmetrically obovate-triangular, laterally compressed, the ventral edge straight, the dorsal edge narrowly rounded, curvate, triple-crested with crests irregularly undulate or coarsely toothed, spongy but thin; faces of fruit shallowly convex, the pericarp sometimes drawn up into flattened tubercles and ventrally bordered by another, lower wing or line of flattened or dome-shaped processes; beak lateral, spurlike, incurved-erect, ca. 0.3 mm long; resin canals numerous, evident, 1 or 2 between the dorsal wings and also over the lateral faces.

Distribution and Flowering Season

Shoals and pools of the Little River, Lookout Mountain, and of Town Creek, Sand Mountain, northeastern Alabama. Flowering from May into July, intermittently till fall.

Special Identifying Features

The hairy filaments of this species place it in the "graminea" complex of Sagittaria. In this complex in the southeastern U.S. only S. graminea or its varieties produce rhizomes of comparable

thickness, but none of these have rhizomes as long. S. teres S. Wats. of the north Atlantic Coastal Plain from Massachusetts south into New Jersey has similar fruit, but this taxon lacks a stout rhizome, spreading instead by means of corm-bearing slender stolons.

Habitat and Management Implications

S. secundifolia is locally abundant along the upper undammed reaches of the Little River in Cherokee and DeKalb counties of northeast Alabama. Its rhizomes creep along grooves and chinks in the conglomeritic sandstones of swift shallows, or in sands, gravels and silts of quieter, deeper pools and shallows. In the quieter waters the scapes are often erect, projecting the flowers a good distance above the water; in the swifter reaches the scapes are normally bent over by the current, thus only the upper part is curved upward. Associated submersed plants are in genera such as Najas, Potamogeton, Myriophyllum; common emergents are in genera Carex, Leersia, Panicum, Ptilimnium, Polygonum, Justicia (the common water-willow J. americana), Lindernia, Ludwigia. Sphagnum seeps are frequent, the sunnier ones predominantly grass-sedge, with many carices, Rhynchospora, Scirpus, Agrostis, Panicum, Leersia, Xyris, Eriocaulon, Ludwigia, Rhexia, Sabatia, Aster, Bidens, etc. The immediate banks are thick with such shrubs as Alnus, Salix, Ilex, Itea, Rhododendron, Kalmia, Lyonia, etc. with an overstory of Salix, lowland oaks, red maple, sweet and black gum, hickory. Bottoms are usually narrow, much of the area being bounded immediately by the steep bouldery canyon slopes which are yellow pine-hardwood, with the pine predominantly shortleaf or loblolly interspersed with P. virginiana, the hardwoods primarily upland oaks and hickories interspersed in the ravine cuts with mixed mesophytic species. Liriodendron is locally plentiful, of its best development in the steep feeder ravines.

Much of the present habitat of the Sagittaria is in Alabama state parkland and is thus protected. However, there are other areas in which private land extends to the canyon rim or, below the lowest park, to the river itself. In such areas timber has been cut for purpose of market, or clear cut to produce pasture or cropland or various residential-recreational development. Such activity presents an erosion hazard and subsequently increases stream turbidity, which through a combination of light reduction in flood season, and excessive siltation, are a hazard to continuance of this rare and local plant. These same sorts of disturbance in the Town Creek watershed to the west have destroyed the populations of Sagittaria there. Also, much strip mining of coal has been going on in the region, with considerable erosion into and poisoning of tributaries.

References

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SPECIES Sagittaria secundifolia Kral

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA		X	NA	
Damage	X				X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: Excessive cutting on steep slopes and in adjacent bottoms increases erosion, siltation, reduces light necessary to growth of S. secundifolia and other submergents, also buries rootstocks.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sagittaria secundifolia Kral



245
POACEAE

→ Andropogon arctatus Chapm. [4] pine-woods bluestem
Sorghum arctatum Kuntze

Technical Description

Diffuse-rooted, tufted perennial.

Culms.-- Few to several in a tuft, to 1.5 meters tall (mostly lower), slender, wand-like, smooth, branching in the upper half, the branches ascending.

Leaves. The longest basal, up to 1/3 the culm length, the sheathes strongly overlapping, sharply folded, pale green or pale purplish, with scattered long pale hairs or strongly pale pilose along the margins and shaggy pilose toward the open apex, strongly multinerved; ligule a low glabrous scale; collar long-pale-hairy; blade flattened, to 4 mm wide, narrowly and rigidly acute or acuminate, the margin scabrid, the midnerve strongly raised beneath, the surface mostly smooth, in length progressively reduced upward, grading into spathes.

Inflorescence.-- Spikelets in racemes, these usually paired, straight, linear when expanded, about 4-5 mm wide (exclusive of spreading awns), 3-5 cm long, and on a common, slender peduncle 5-12 cm long, its villous apex projecting well beyond the narrow, inrolled subtending spathe, the tip of which is attenuate, the margins and apex inside long-white ascending-hairy.

Spikelets.-- Sessile (fertile) spikelet ca. 4-5 mm long (exclusive of awn), on a rachis joint that is flattened, ca. 2 mm long, copiously pilose-ciliate from near base to apex; glumes 2, longer than the fertile and sterile floret, lanceolate, firm, the first glume with a strong median groove, thus concave, there smooth, the base pilose, the cartilaginous edges scabrid, the apex bifid, the second glume sharply keeled, the keel scabrid, the surfaces otherwise smooth, the apex acuminate and purplish. Sterile and fertile lemma thin, translucent, shorter than glumes, the narrow apex of the fertile lemma terminating in a yellowish, twisted, hispidulous awn 8-10 mm long. Stalked spikelet vestigial or absent, on an outward-bending, flattened, pilose pedicel 2-3 mm long. Fruit not observed.

Distribution and Flowering Time

Moist, low, grass-sedge clearings in pine flatwoods and savanna, northwest Florida and southeastern Alabama; flowering from late September to frost.

Speical Identifying Features

This species most resembles A. ternarius, a common species throughout the south usually of drier sites, but differs from it in its shorter spikelets, narrower and tawnier racemes (hairs on A. ternarius racemes make these silvery-white by contrast). The first glume of A. arctatus is much more deeply longitudinally grooved.

Habitat and Management Implications

This rare species roots in moist sandy peat of open pine flatwoods and savannas,

there being found in sunny, grass-sedge communities bordering titi, shrub bog, or pitcher plant bog. The dominant trees of the area are Longleaf pine and Pond pine, with other species often being Nyssa biflora, Taxodium ascendens. As is true of other moist pineland savanna species, this one is maintained by fire, lost through drainage. It has not been observed under closed canopies of pines either in natural regenerated stands or plantations. Its reaction to soil disturbance has not been observed, but it doubtlessly invades clearings if ground is not drained.

References

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SPECIES Andropogon arctatus Chapm. pine-woods bluestem

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: drainage of site is detrimental; mechanical disturbance of site may, if disturbed tracts are not drained, be beneficial

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Andropogon arctatus Chapm.



245
POACEAE;

→ Andropogon niveus Swallen [1-2]
Schizachyrium niveum (Swallen) Gould
status: Threatened

Technical Description:

Strongly tufted perennial grass 3-5 (-7) dm tall from slender fibrous roots, perennating by short lateral offshoot buds from base.

Culms: erect, slender but stiffish and wiry, the internodes numerous and rather short, smooth, terete to oval in cross-section, 0.2-0.5 mm thick, pale green to straw-colored, the nodes thickened, smooth.

Leaves: Sheathes strongly overlapping at culm base and persisting as fibres, more distant distally, smooth, strongly ribbed, slightly inflated, somewhat keeled; ligule an erect, firm-edged, otherwise thin, keeled, subtruncate, erose to minutely ciliate, scale 0.2-0.4 mm long; blades shortest toward culm base and tips, longest at mid-culm, spreading to reflexed, there lineal, ca. 1 mm wide, mostly 2-5 (-9) cm long, tapering from about midblade to a narrowly acute, scabrid apex, the margins slightly thickened, smooth or minutely scabrid, the midrib strongly raised beneath, the upper surface opposite the midrib strongly grooved, both surfaces at first pale green, later brownish or maroon-tinted, smooth.

Inflorescence: Racemes (2-) 3-5, narrowly lineal, mostly 3-5 cm long, rather distant, rarely overlapping, erect, solitary on slender peduncles 5-6 cm long, these usually well exerted beyond a slender, inrolled peduncular sheath (spathe); rachis of raceme jointed, the joints narrowly clavate, truncate to oblique at hollowed summit, ca. 4-5 mm long, the margins from near base to apex strongly ciliate-bearded with white hairs, those toward joint apex fully 3 mm long.

Spikelets: one pair to each rachis joint and falling with them, the sessile ones perfect or unisexual, the first glume 5-6 mm long, narrowly triangular-lanceolate, firm, the back rounded, stramineous, apically green, the narrow apex with 2 narrow, short, erect teeth, the second glume about as long, keeled-folded, the keel green, the fertile lemma and palea shorter than the glumes, scarious, the floret awned from base, the awn twisted, ca. 1 cm long, bent slightly above the middle; stalk of stalked spikelet densely bearded ciliate as in rachis joints, ca. 4-5 mm long, the spikelet narrowly triangular, green, including the apical long but weak awn ca. 3 mm long; stamens 3, the anthers ca. 3 mm long.

Distribution and Flowering Season:

Deep white or yellow sands of sandhills, central peninsular Florida; flowering from September to frost.

Special Identifying Features:

A. niveus is part of a complex of andropogonids that have the raceme rachis joints hollow at apex, there truncated, and which have primary peduncles terminating in but a single raceme of spikelets (genus Schizachyrium, according to Gould et al). Within this group it stands out from the rest by a combination of its slender, rather low, habit,

its very slender, strongly white-villous-margined rachis joints and spikelet stalks (which give it a strong superficial resemblance to some Andropogon in sect. Arthrolophus!), its nearly completely smooth foliage and its densely caespitose habit. Also distinctive is the tendency for the mature raceme to be straight, rather than sinuous as it is in closely related species.

Habitat and Management Implication:

A. niveus appears to be confined to dry sandy areas in sandhills scrub, where, along with various Aristida, Cenchrus, Panicum, Sorghastrum secundum, and other Andropogon (particularly A. floridanus), Paronychia, Stipulicida, Lechea, Petalostemon carolinianum, Heterotheca, Opuntia, etc. it may be locally abundant. Common understory shrubs and low trees are Garberia, Ceratiola, Ilex, Bumelia, Lyonia, Asimina, Osmanthus, Ximinea, Myrica, shrubby evergreen Quercus, Persea, etc. Common overstory associates are Pinus clausa, P. elliotii, or P. palustris, though of the pines the first is usually the most frequent. With the pines on white sands such hardwoods as Quercus myrtifolia, Q. chapmanii, Q. geminata, Carya floridana dominate with a shift over toward Quercus incana, Q. margaretta, Q. laevis on the yellow sands where Pinus palustris is more abundant. In natural conditions such shade intolerant grasses as this Andropogon give way to invading reproduction of shrubs and trees, but increase directly after natural fires sweep through. Mechanical clearing of scrubland provides open sandy area for its increase, if there are contiguous seed sources available.

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- Swallen, J.S. 1941. Andropogon niveus, sp. nov. in Wash. Acad. Sci. Journ. 31: 354.

SPECIES Andropogon niveus Swallen

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage No Lasting Effect		X	NA	X				X
Beneficial if Done Properly	x				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Estimated Range of:

Andropogon niveus Swallen



245
POACEAE:

100
Calamovilfa arcuata K. E. Rogers ¹¹⁻²¹ Cumberland reedgrass

Technical Description

Perennial grass. Culms mostly 8-15 dm. tall, few to several to a clump, arising from ascending, thickish, fibrous-scaley rhizomes. Culms terete, slender, erect or ascending, somewhat nodding toward the summit.

Leaves: Ascending, pale-green, rather firm, to 50 cm. long; sheathes firm, pale yellow-green, open toward the summit, the narrow margins long-ciliate, the backs loosely pilose, the short ligule and the collar pilose with pale long hairs; blades linear, ascending, about 5 mm. broad, tapering very gradually to very slender, angulate tips, many-nerved, the edges harsh, the inner faces toward the ligules pilose. Leaves diminishing in size upward on the culms, somewhat hairier, the uppermost blade exceeded by the inflorescence.

Inflorescence: Spikelets in erect to somewhat nodding reddish-purple panicles, the primary branches scattered or nearly whorled, the axils pilose, the axes flexuous, the spikelets themselves tending to be crowded toward the apices of the branches and branchlets. Stalks of spikelets various in length, from 2 mm. up to 1 cm. Spikelets mostly 6-7 mm. long, lanceolate, reddish-purple, the first glume lanceolate, 1-nerved, slenderly acuminate, about 3 mm. long, the second glume similar but with a longer, more slender tip, about 5 mm. long; the margin thin, entire.

Florets: Floret base with callus pilose with long, pale hairs, the lemma narrowly lanceolate, about 6 mm. long, the apex slenderly acuminate, arched outward, the margins somewhat inrolled particularly toward the slender tip, the back somewhat keeled, and scattered pilose toward the base; palea 4-4.5 mm. long, lanceolate, acute or short-acuminate, the back furrowed and 2-nerved toward the base, hairy between and on the nerves. Stamens 3 mm. long.

Distribution and Flowering Season

Organic gravel and sand of bars and banks of streams, locally abundant along Daddy's Creek in the Cumberlands of Tennessee; Pushmataha County, in southeastern Oklahoma. Flowering in August, September.

Special Identifying Features

A quick glance at the tallish, slender, tufted plants with their panicles of purplish spikelets would make one think of the common grease-grass,

Triodia flava. Spikelet characteristics however, are clearly those of Calamovilfa. It is nearest C. brevipilis, a rare species of the Coastal Plain from New Jersey south to South Carolina but differs from it in its pilose (rather than glabrous) nodes and collar, its longer ligule, its hairier leaves, its pilose pulvinus, its longer spikelets and its arcuate (curvate) lemma tips.

Habitats and Management Implication

The habitat of this restricted species appears (at least in Tennessee) to be one of alluvial bars or banks of creeks. Daddy's Creek, the only known locality for it in Tennessee, is a swift, usually clear, rocky shallow Cumberland stream that flows through mixed hardwood, hemlock, yellow pine forest, its banks with dense growths of alder, dogwoods (mostly Cornus amomum), willow, Itea, Hypericum, Ilex verticillata, etc. The stream bedrock and boulders are mostly sandstone and in many places boulders, gravels and sands form bars which have stabilized and picked up finer alluvium. On these have formed rather dense growths of shrubs with the openings made up of mixed grasses (mainly Andropogon, Panicum) and sedges together with a scattering of composites. Here the Calamovilfa appears, the tufts solitary or numerous depending on the size of the small clearings in the brush. The substrate is always at least damp, is sandy and gravelly with a good admixture of organic material. The plants are probably maintained by periodic creation of new bars through stream action, together with the washing away of sufficient shrubby competition to create new openings. This is a grass of full sunlight, so that development of heavy shrub cover or overstory shades it out. Occasionally plants are found growing in cracks in boulders at midstream.

Management of the area this plant frequents would have to be such as to preserve the watershed intact. Heavy logging of same would result in a more erratic flooding pattern, longer periods of high water than the short periods these bar plants are accustomed to. The steep topography would lessen the usefulness of any logging activity save careful selection. The main threat, at least to the type locality, is in the extensive development of vacation community housing in that area (e.g. Fairfield Glade Community).

References

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Revised March 1980

SPECIES: #146 Calamovilfa arcuata K. E. Rogers; Cumberland reedgrass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy						X	X	X
Damage								
No Lasting Effect	NA	NA	NA	NA				
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Calamovilfa arcuata K. Rogers



245
POACEAE;

100
Calamovilfa curtissii (Vasey) Vasey [1-3] ~~curtis'~~ reed-grass.
Ammophila curtissii Vasey

Technical Description

Perennial, tufted, slender but rather coarse grass, mostly 1.0-1.5 (-1.8) meters tall, with culms arising terminally from spreading or ascending, thick and thick-rooted, knotty rhizomes, these covered by imbricated chaff of old sheath bases.

Culms.-- Erect or ascending, 1-few from a rhizome, stiffish, toward base ca. 5 mm thick, a lustrous yellow-green, brownish in the region of the swollen nodes, the lowermost internodes sometimes excurved.

Leaves.-- Up to 9 dm long; lowermost sheathes strongly overlapping, fully 1 cm broad at the gray-brown base, backs rounded, upwardly becoming stramineous and lustrous; median and upper sheathes more cylindrical, usually as long as or longer than the internodes, stramineous, lustrous; all sheathes apically rounded-auriculate, here entire or sparingly pilose; ligule a low, puberulent and ciliolate ridge; blades dull green to 5 mm wide, very firm, the lowermost sometimes flat, but most usually strongly involute even at base, tapering to very elongate, spreading-recurved, flexuous, filiform, scabrid tips, the margins scabrid.

Inflorescence.-- A narrow, rather dense panicle 3-5 dm long, at first concealed in the uppermost subtending leaf, later well exceeding it, the spikelets numerous on the overlapping, erect or ascending panicle branches on smooth erect peduncles mostly 3-10 mm long, the panicle branches terete, smooth, producing spikelets nearly their whole length or as much as the lower 1/2 naked.

Spikelets.-- In outline lanceolate, pale green with maroon tints, 4-5 mm long; glumes 2, lanceolate, keeled, smooth, acuminate to acute, the single scabrid nerve often excurrent as a short mucro, the first glume 3.0-4.0 mm long, the second ca. 4.0-5.0 mm long; floret solitary on a short rachilla joint, this at its apex pilose with silvery-silky erect hairs; lemma and palea thin, pale green lanceolate, narrowly acute or acuminate, subequal, ca. 5 mm long, the lemma mostly crisped-white-pilose toward its base, the palea similarly pilose at least along the 2 keels. Stamens 3.

Distribution and Flowering Season

Moist sands or sandy peats of slash and longleaf pine-saw palmetto flatwoods and flatwoods savanna, northeastern and eastern peninsular Florida; flowering in summer.

Special Identifying Features

The genus Calamovilfa, and particularly this species, bears particular resemblance to some Calamagrostis and Ammophila. It differs from the former in its glumes not being longer than the lemma, from the latter in its shorter rachilla joint. C. curtissii differs from other southeastern species of its

genus by its combination of very thick rhizome and very narrow panicle, together with the pilosity of the lemma and palea backs.

Habitat and Management Implications

C. curtissii is an inhabitant of pine flatwoods, its thick rhizomes rooted in moist, usually organic sand, this usually with a high hydroperiod. The overstory is usually a scattering of both Slash and Longleaf pine, the under-story predominantly Serenoa repens intermixed with ericads such as Lyonia, Befaria. It is a savanna plant, maintained by fire, and its herbaceous associates include several Andropogon, Panicum, Aristida, Polygala, Xyris, Rhexia cubensis, Eriocaulon, Lachnocaulon, Eryngium aromaticum, etc. Cutting of the trees opens up area for this type, as does burning. Drainage destroys it, as does fire on the drained land. Overplanting with pine has a negative effect, such grasses as C. curtissii being shaded out as the crowns close.

References

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- _____. 1892. Monograph of the grasses of the U.S. and British America. Contrib. U.S. Nat. Herb. 1-89.

SPECIES Calamovilfa curtissii (Vasey) Vasey. Curtiss' reedgrass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X		X			X	?
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: drainage of site is detrimental

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Calamovilfa curtissii (Vasey) Vasey



245
POACEAE:

Ctenium floridanum (Hitchc.) Hitchc. Florida orange-grass.
Campulosus floridanus Hitchc.

Technical Description

Perennial grass from scaly rhizomes.

Culms.--Solitary or clumped, terete, slender and wand-like, to 1.5 meters tall, proximally smooth, distally scabro-puberulent or cinereous.

Leaves.--Rhizomal leaves tightly overlapping, scale-like, scarious-margined, straw-colored; basal leaves crowded, the sheathes open and strongly overlapping, the lowermost ones short-bladed and grading into rhizomal ones, the uppermost ones becoming greener, often tinged with maroon and with narrowly linear, green blades 5-30 cm long, mostly 3-5 mm wide, frequently involute, strongly multiverved, the upper surface scabro-puberulent on the nerves; ligule a narrowly triangular, pale, scarious, acute, lacerate-fimbriate scale to 5 mm long; mid-and-upper culm leaves few, scattered, the sheathes shorter than the internodes and closed proximally, the blades shorter, narrower and more involute than those of culm base.

Inflorescence.--Spikelets unilateral in a terminal spike, numerous, close-set, sessile, alternating in 2 rows along the concave side of and perpendicular to a single, slender, slightly excurved, greenish-purple, convex-backed spike rachis 4-15 cm long, this sometimes also spiralled, the whole inflorescence laterally quite flattened, when viewed from the side resembling a narrow comb, with reduced spikelets narrowing it at each end. First glume narrowly triangular, 1.5-2.0 mm long, scarious, keeled, the single nerve excentric, greenish, scaberulous, the glume base dorsally with a conspicuous, spongy, pulvinar swelling; second glume lanceolate, narrowly acute, 4-5 mm long, scarious with 3 strong (but not complete) longitudinal green nerves, the median one bearing midway up an excentrically spreading, rigid, swollen-based awn 3-4 mm long, the lateral ones bearing (or lacking) a scattered row of inconspicuous, yellowish glands; rachilla base (callus) bearing a strong tuft of slender, erect, white bristles; first lemma empty, scarious, ca. 3 mm long, oblong-elliptic, the apex emarginate, the single green nerve dorsal, excurrent as a straight awn, the edges plumose-ciliate; second lemma staminate or empty, similar in awning and shape to the first, but ca. 3.5 mm long and containing a slender, reduced linear palea 2.5 mm long; 3rd lemma like the others, the body ca. 3.5 mm long and similarly awned, the palea nearly as long, apically bifid; additional lemmas 2 or 3, reduced, subtended by a rachilla joint ca. 1 mm long.

Fruit.--Grain narrowly cylindrical, dark brown, ca. 2 mm long,

Distribution and Flowering Season

Sandy, moist to quite dry ecotones between longleaf pine scrub or wiregrass, and pine flatwoods ponds or depressions, northern peninsular Florida north into southeastern Georgia; flowering and fruiting from August to frost.

Special Identifying Features

Of the 12 species in this small genus only two are native to the U.S.A. and C. floridanum is nested into but a small part of the range of C. aromaticum, which is widespread in savannas and flatwoods clearings in the Coastal Plain from Virginia south to Florida and west into Louisiana. The two are easily distinguished in that the former blooms and fruits later in the year, has prominent scaly rhizomes (lacking in C. aromaticum, a much more tufted plant), has a much longer ligule, takes a generally drier habitat, and either has less prominent glands along the midrib of the 2nd glume or lacks these glands entirely.

Habitat and Management Implications

C. floridanum appears to take a distinctly drier habitat than does C. aromaticum, and rarely dominates its landscape. The plants are generally scattered in savanna-like sites on dryish sandy soils and are in association with several species of upland Aristida (mainly A. stricta), Andropogon, Sporobolus, Anthraenantia villosa, Digitaria villosa, many Dichanthelium panicum, Heterotheca (gossypina, microcephala, scabrella, etc.), Helianthus floridanus, Liatris gracilis, L. tenuifolia, Agalinis setacea, etc. It is usually in what appears to be a transitional zone between longleaf pine-turkey oak scrub, or live oak-pine savanna and pine-saw palmetto-gallberry flats or pineland ponds. In the same parts of Florida and Georgia, C. aromaticum occupies a distinctly wetter habitat, being particularly abundant on the black sandy peat of pineland savanna or even in bogs.

Much of the habitat of C. floridanum is being destroyed through residential-industrial developments on the one hand, and through mechanical site preparation for plantation pine on the other. This grass was probably maintained in nature by periodic natural woods fires which would have tended to reduce competition by woody plants, favoring the dryish savanna systems.

References

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Chapel Hill, N. C.

SPECIES Ctenium floridanum (Hitchc.) Hitchc. Florida orangegrass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X		X			X	X
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Ctenium floridanum (Hitchc.) Hitchc.



245
POACEAE!→ Elymus svensonii Church [2-3]

Status: Proposed endangered

Technical Description:

Tufted, e-rhizomatous perennial glaucous grass from a diffuse-fibrous root.

Culms: Erect but arching-nodding-tipped in flower and fruit, terete, pale yellow-green, numerous leafy and therefore with lower nodes and internodes mostly covered by sheath, exposed nodes subtended by a slightly concave purplish or dark green band.

Leaves: 6-8, the leaf sheaths mostly overlapping, pale green, straw-colored or pinkish, rather tight when young, the thin edges meeting or overlapping save at apex, there flanged to form at the collar a firm, lustrous-cartilaginous auricle, this produced outward to a pair of spreading, narrowly triangular, brownish or purplish lobes; ligule continuous, an erect, when young purplish, erose-edged scale 0.2-0.3 mm high; leaf blades spreading or erect, the lowest withered by anthesis, lineal, flat save for the very slender, long-tapering involuted tips, the longer blades 1.5-3.0 dm long, the margins slightly thickened, scabrid, the upper surface deep green, finely ribbed, scattered-pilose, the lower surface markedly paler, smooth, finely raised-ribbed.

Inflorescence: Spikelets numerous, sessile in pairs in a slender, somewhat interrupted, narrow, excurved spike 10-18 cm long, 5-10 mm thick (exclusive of awns!), the spike rachis somewhat sinuous, the joints flattened, 0.7-0.8 cm long, the margins harsh, with the spikelet pairs alternate on opposite sides, thus in 2 opposite rows with lemma tips (exclusive of awns) barely or not at all overlapping on a side.

Spikelets: 4 (-5)-flowered, flattened somewhat in a plane perpendicular to the rachis (edges to it), erect, exclusive of awns 1.0-1.5 cm long, the glumes 2, subulate-setaceous, scabrid, 1-10 (-18) mm long or (particularly on basal spikelets) absent, from a strong, purple-margined callus, erect, terete save toward base, smooth proximally, antrorsely scabrid apically, often purplish-tinted; fertile florets usually not more than 3, the terminal one sterile, much reduced at tip of a conspicuous rachilla joint, the fertile lemmas ca. 1 cm long, narrowly elliptic or elliptic-lanceolate, the broadly rounded backs smooth, pale yellow-green, the nerves confined to the inrolled margins, with the midrib evident only apically where excurrent as a strong, ascending-excurved, antrorsely scabrid, often purplish, awn 2.0-2.5 cm long; palea elliptic-linear, thinner than the lemma and slightly shorter, its apex narrowed, truncate to slightly emarginate, its back slightly concave, sharply involute at the marginal green nerve; stamens 3, the anthers yellow, lineal, ca. 5 mm long.

Fruit: Grain oblong, brown, ca. 6 mm long.

Distribution and Flowering Season

Dryish calcareous rocky river bluffs, so far known only from along the Cumberland River near Nashville and along the Caney Fork River in middle Tennessee; flowering in late May and June.

Special Identifying Features

This rare grass is distinguished as part of a small complex of eastern North American species which have setaceous glumes unequal in length or even vestigial. There are but two others besides E. svensonii, namely E. hystrix L. (Hystrix patula Moench) and E. diversiglumis Scribn. & Ball. The former, which shares the same habitat, has stiffly erect spikes and spikelets spreading horizontally; its glumes often do not develop at all (in E. svensonii the spikes tend to nod or excurve strongly, the spikelets tend to be erect and usually at least some spikelets have well developed glumes. The latter, which does not overlap in range, has erect spikelets as in E. svensonii but its lemma backs are densely hirsute. Its foliage is not glaucous as it is in E. svensonii. Were it not for the unequal glumes, E. svensonii most resembles H. interruptus Buckl. (E. canadensis L. var. interruptus (Buckl.) Church), a taxon now considered to be endemic to western Texas.

Habitat and Management Implication

E. svensonii thus far has been found only on shallow soils over bluff limestones, usually in full sun but sometimes in light shade. In the two known localities it is abundant and reproducing freely. The soil is thin, sticky when wet, basic in reaction, quite dry in summer. The forest of these areas is indicative of the basic character of the soil, is mostly hardwoods with patches of Juniperus virginiana in various stages of succession to hardwoods. Common trees are Carva carolinae-septentrionalis, C. ovata, Quercus shumardii, Q. muhlenbergii, Q. alba, Ulmus serotina, U. americana, U. rubra, U. alata, Celtis laevigata, Morus rubra, Gleditsia, Robinia pseudo-acacia, Acer saccharum, Fraxinus americana, F. quadrangulata, Tilia americana, etc. The understory is heavy in Cercis, Rhus, Viburnum rufidulum, Rhamnus caroliniana, Bumelia lycioides with the lower shrub layer dominated by Hypericum frondosum, Rhus aromatica, Symphoricarpos orbiculatus. Herbaceous associates include Woodsia obtusa, Asplenium, Pellaea, Bromus purgans, Chasmanthium latifolium, various Panicum, Festuca obtusa, other Elymus, particularly E. hystrix, E. virginicus, Danthonia spicata, various carices, Mirabilis, Arabis laevigata, A. canadensis, Ranunculus fascicularis, Aquilegia canadensis, Geum vernum, G. canadensis, Spigelia, Lithospermum, Campanula americana, Rudbeckia triloba, various Solidago, etc. In the Caney Fork locality are rarities that either are found to the west or north (Erysimum capitatum), to the south (Eriogonum harperi) or northeast (Draba ramosissima). This Wild-rye is most abundant on rocky slopes and ledges where it gets full sun, and in fact is thriving on one stretch of road cut.

Logging would pose a threat, making the thin soils more susceptible to erosion, but the very steepness of the terrain makes this activity unlikely. In that the Elymus is a species of light shade or woodland edges, careful removal of some trees might actually increase suitable habitat. Pasturing has undoubtedly caused some damage in the Caney Fork area, but the stock has been fenced away from the steepest slopes and bluffs where the Elymus is most abundant.

It is encouraging that this grass will occupy freshly disturbed area such as road cuts.

References:

Church, George L. 1967. Taxonomic and genetic relationships of eastern North American species of Elymus with setaceous glumes. Rhodora 69 (778): 121-162.

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SPECIES: ELYMUS svensonii Church

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy	NA	NA	NA	NA			NA	
Damage						X		X
No Lasting Effect					x			
Beneficial if Done Properly								

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:

Elymus svensonii Church



245
POACEAE!

100
→ Glyceria nubigena Anders. [i] Smoky Mountain manna-grass

Technical Description

Tufted, smooth, short-rhizomatous, perennial grass.

Culms.-- Erect or ascending, decumbent-based, to 1.5 meters tall, often rooting from the lower nodes, rather soft, toward base 2-4 mm thick, the nodes brown or reddish-brown, the internodes multiribbed, pale green.

Leaves.-- Sheathes opening distally, multinerved, green-tinted often with red or purple, at mid-culm much shorter than the subtended internode; ligule a thin erect scale to 4 mm long; blades rather soft, green, ascending, linear, 5-10 mm wide, tapering to a narrowly acute tip, the margins scabrid, the larger blades 2-3 dm long becoming shorter, usually less than 1 dm toward the inflorescence, both surfaces scabrid along the many prominent veins.

Inflorescence.-- Spikelets numerous in an open, diffuse, lax panicle, the panicle branches spreading or drooping toward the tips, very slender, scabrid, naked toward base, rebranched at middle or above (very rarely floriferous to nearly base), the ultimate branches bearing scattered, rarely overlapping, stalked spikelets; spikelet stalks 3-10 mm long, capillary, scabrid.

Spikelet.-- At maturity elliptic or oblong, ca. 5 mm long; glumes 2, ovate or broadly lanceolate, acute or narrowly rounded, the first (lowermost) ca. 1.0-1.5 mm long, shorter than the second which is ca. 1.5-2.0 mm long, the backs pale green, that of the second usually with 3 strongly raised nerves, the margins broad, pale scarious; florets mostly 4, the larger lemmas ca. 3 mm long, lance-elliptic, narrowed to white, scarious, somewhat erose tips, the backs with 7 strongly raised, parallel nerves, the nerves stopping short of the apex, the green surface bordered by a narrow purplish band, this internal to a broad, scarious margin; palea about equal in length to lemma, the 2 nerves sublateral, strongly scabrid; grain ellipsoidal, dark reddish-brown, ca. 2 mm long.

Distribution and Flowering Season

Seep swamps and bogs at higher elevations in the Blue Ridge, western North Carolina and eastern Tennessee; flowering in June and July.

Special Identifying Features

G. nubigena, within the complex of Glyceria that have 7-nerved lemmas, and in general aspect, is closest to G. grandis but that more northern species has much more purplish florets and has subequal glumes.

Habitat and Management Implications

G. nubigena is in boggy places, either in full sun or shade, in the higher mountainous areas of the Blue Ridge, Surrounding forest is usually in the fir or spruce-fir type, or is Hemlock-hardwood. It may also be in seep

areas in high elevation grass balds. In either event it is part of a wetland complex of grass-sedge. Draining the site would eliminate the species; logging in or around the seeps would not only alter the drainage but the substrate as well.

References

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- Hitchcock, A.S. 1950. Manual of the grasses of the United States, 2nd ed. (revised by A. Chase). U.S.D.A. Misc. Publ. 200: 81-93.
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SPECIES Glyceria nubigena Anders. Smoky Mountain manna-grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA		X	NA	X
Damage					X			
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: site drainage is detrimental!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Glyceria nubigena Anders.



245 POACEAE

→ Manisuris tuberculosa Nash [1-2],
Status: Threatened

Technical Description:

Perennial, smooth, tall grass, the culms solitary or in small tufts, sometimes stocky-rhizomatous, the roots fibrous.

Culms: erect or ascending, 8-15 dm tall, slender but rather stiff, brittle, wand-like toward apex, terete, the internodes several, the lower internodes mostly covered by sheath, the middle and upper ones shortest, mostly exposed, green or pale purplish or reddish-green, 4-5 mm thick, the nodes swollen, the collar a narrow purplish band.

Leaves: distichous, toward base crowded, the sheathes there strongly overlapping strongly keeled (folded sharply) and forming a chevron pattern, those upward on culm increasingly more distant, the larger ones less than 1/2 the leaf length; ligule a thin, erect, ragged margined scale 1.5-2.0 mm high; leaf blades erect or ascending, narrowly linear, to 6 dm long, proximally somewhat folded, upwardly flattened but midrib prominent throughout, toward apex gradually narrowing to a narrowly acute tip, the margins distally minutely scabrid, the surfaces when young green, but usually by flowering and fruiting time turning brown or maroon.

Inflorescence: culms branching from upper nodes, the ultimate peduncles branching from these branches, all branches ascending or arching slightly outward, the total inflorescence narrow, the many peduncles 5-10 cm long, sleeved half or more their slender length by tubular spathe sheaths, and each terminating in a narrowly cylindric raceme, this 3-6 cm long, straight or excurvate, the raceme rachis jointed, the joints thickish, rectangular in outline, ca. 3.0-3.5 mm long, separating at maturity, each in cross-section semicircular, thus the back rounded and ribbed, the inner face flattish or slightly concave, producing at its base 2 spikelets, 1 sessile and fertile, the other reduced, smaller, sterile, and borne on a stubby stalk (rachilla) similar to the rachis joint and of the same length.

Spikelets: paired as stated above, the sessile one 1-flowered, lance-triangular, flattened against the rachis joint and stalk of sterile spikelet, ca. 4 mm long, the first glume external, giving the spikelet its shape, firm, lustrous, nearly smooth or with a few widely spaced domeshaped processes or transversely-oriented low, truncated tubercles on its back, its abruptly infolded margins narrow, scarious, and enfolding much of the rest of the spikelet; second glume thinner, about as long as the first glume but sharper pointed and keeled; fertile lemma very thin, pale, keeled, triangular, acute, about as long as the first glume; fertile palea also thin, slightly shorter than the lemma, blunter, the back slightly convex, not keeled; mature anthers 3, on shortish filaments, oblong, ca. 3 mm long, cinnamon-red; stalked spikelet similar to sessile one but smaller, and of only the 2 glumes.

Grain: oblong-linear, slightly shorter than the palea.

Distribution and Flowering Season:

Sandy peaty margins and shallows of pineland ponds, karst lakes

and ponds, savanna swales, northern peninsular Florida, west into the Florida panhandle and southern Alabama. Flowering and fruiting from June till frost.

Special Identifying Features:

There is no doubt that the nearest species to M. tuberculosa is M. rugosa (Nutt.) Ktze. The two might well be considered varieties or mere forms of one species in that the only difference between them is the degree of rugosity of the backs of the glumes, which in M. rugosa are strongly and deeply transversely rugose. The raceme rachis joint in the latter is also medially contracted, a feature not held by M. tuberculosa.

Habitat and Management Implication:

M. tuberculosa appears to be confined to karst areas in Florida and Alabama and there may be abundant locally on the margins or in shallows of lakes and ponds or in wet savanna swales. Its shallow roots are in sandy peat or sandy peat-muck, a substratum that is usually at least moist, generally saturated. It may be in pure stands or scattered in an essentially grass-sedge meadow with such grasses as Panicum tenerum, P. hemitomon, P. condensum, P. rigidulum, various Andropogons, Aleocharis cellulosa, E. melanocarpa, E. vivipara, E. interstincta, E. tricostata, Dichromena colorata, Psilocarya nitens, Cyperus articulatus, C. strigosus, C. distinctus, Rhynchospora microcarpa, R. perplexa, R. tracyi, R. inundata, etc., Scirpus americanus, many Xyris, many Polygonum, many Ludwigia but especially L. alata, L. suffruticosa, Rhexia, Proserpinaca, shrubby and herbaceous Hypericum, etc. Such areas are typically very unstable as regards water level, during some seasons drying completely, during others filling up to surrounding forest. Thus the Manisuris may be part of a large belt or expanse of waving grass-sedge or not much in evidence at all during times of extreme drought or extreme flooding. This makes meaningful population estimates difficult. Shallower ponds tend to fill up gradually, Hypericum, Stillingia, Crataegus (wetland species), Nyssa biflora, N. ogeche, Taxodium ascendens, Ilex taking over. Immediate uplands may be dominated by Live Oak, the higher ground above these Longleaf Pine-deciduous scrub oak, Sand Pine-evergreen scrub oak, or sometimes high hammock with plenty of Cabbage Palm.

Logging of the better trees, these usually at the upper edge of maximum pool or above would probably have little adverse effect unless it were accompanied by extensive soil disturbance or followed by some of the more destructive methods of site preparation. It is also suggested that drainage ditching into the high hydroperiod soils of the pondshores and bottoms, as has sometimes been done, is detrimental.

References:

Hitchcock, A.S. & Agnes Chase. 1951. Manual of the grasses of the United States, ed. 2 (revised by A. Chase). U.S.D.A. Misc. Publ. 200, pp. 785-787.

Kral, R. 1973. Some notes on the flora of the southern states,
particularly Alabama and middle Tennessee. *Rhodora* 75 (803): 366-410.

Small, J.K. 1933. Manual of the southeastern flora, pp. 41.

SPECIES: Manisuris tuberculosa Nash

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		NA	NA	NA			X	
Damage No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Upslope clearcutting or mechanical site preparation may cause problems with sedimentation. Drainage destroys the habitat!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Known Distribution of:
Manisuris tuberculosa Nash



245 POACEAE;

→ Panicum hirstii Swallen. [1-1] Hirst's panic-grass

Technical Description

Perennial grass in sect. Dichanthelium, the culms usually in small tufts from overwintering rosettes.

Culms.--Erect or leaning, slender, to 8 dm tall, longitudinally ribbed, smooth, at mid-culm with internodes longer than subtending sheaths.

Leaves.--Rosette leaves spreading, broadly lance-linear, acuminate, mostly 3-4 cm long, smooth, strongly nerved, the margins thin; culm leaves several, gradually reduced in length from ca. mid-culm both upward and downward on culm, narrowly lance-linear-bladed, the sheathes mostly shorter than internodes, purplish-tinged, strongly ribbed, smooth, save for the pilose margins, the longest blades mostly 8-14 cm long, smooth, in the vernal culms flattish, inrolled only toward the narrowed tips, in the autumnal culms strongly inrolled, always erect or ascending, firm.

Inflorescence.--Spikelets several to very many in a panicle, this 3-7 cm long, in outline narrowly elliptical, the numerous panicle branches thus strongly ascending, all branches smooth, the primary ones sinuously contorted, the stiffish, ascending lateral peduncles shorter than the spikelets, mostly secund (unilateral on branches). Spikelets.--Narrowly to broadly obovoid, ca. 2 mm long, asymmetrical, often obpyriform, strongly ribbed, smooth (or pilosulous), pale green, bluntish; first glume scarious, pale, broadly rounded or obtuse, nerveless, 0.5-0.8 mm long; second glume about as long as the fertile lemma, toward its tip often purple-tinged; sterile lemma slightly longer than the fertile (thus ca. 2 mm long), otherwise similar to the second glume; fertile lemma with a short, incurved, hispidulous point, the strongly convex back whitish, shining, minutely and distantly papillate.

Distribution and Flowering Season

Wet savanna and pine barren ponds, Coastal Plain, southern New Jersey and southwestern Georgia. Vernal culms in May, June; autumnal culms from August to frost.

Special Identifying Features

This Dichanthelium Panicum is placed in the Sect. "Angustifolia" on the basis of the stiffish, erect, narrow blades which tend to taper from near base to apex, the obpyriform, conspicuously

or inconspicuously pustular spikelet which is usually strongly nerved and blunt-tipped, and the bushy-branched (distally) autumnal habit. Tentatively, R. Harper placed it in P. roanokense on the basis of small spikelets, smooth foliage, smooth nodes, which thus means he interpreted it as being in Sect. "Dichotoma", but the inflorescence branching in P. hirstii forms a narrower system. Greatest difficulty comes with P. neuranthum Griseb., which in no way differs from the type description or the type material other than in the spikelet being "finely papillose-pubescent". P. neuranthum is found mostly in wet savanna, edges of islands in everglades, moist open swales, in Cuba, British Honduras, southern Florida northward locally to southern Alabama, southern Mississippi and Texas. In that there are frequent instances of species of "Dichanthelium" varying widely from smooth to pubescent in spikelet, it would seem to me that P. hirstii is certainly a weak species and probably is a glabrous variant of P. neuranthum Griseb. This last, by Gould and overconservatively, has been placed in the synonymy of Dichanthelium angustifolium (Ell.) Gould.

Habitat and Management Implications

Panicum hirstii, if it is a species, is found in areas that are at least intermittently wet, usually in full sun or light shade. It is to be looked for around and in shallow, intermittent or fluctuating pineland ponds, the plants rooted in sandy-peat-muck and mostly associated with grass-sedge bog species. These systems frequently burn or are burned over during dry cycles, and this is probably a significant management factor in keeping woody reproduction from closing over the herbaceous cover and shading or crowding it out. The forest overstory around P. hirstii ponds in southwest Georgia is primarily Taxodium-Nyssa, with varying admixtures of Pinus serotina, P. palustris, P. elliotii, Acer rubrum, Fraxinus (in southern New Jersey Taxodium is absent but Chamaecyparis present, and the dominant Pinus is P. rigida). Management to protect P. hirstii would have to exclude drainage, excessive soil disturbance including any methods of mechanical site preparation. Controlled burning would favor the species.

References

- Gould, F. W. 1975. The grasses of Texas. College Station, Texas.
- Hitchcock, A. S. & Agnes Chase. 1950. Manual of the grasses of the United States. U.S. Govt. Printing Office, Washington.
- Swallen, J. R. 1961. A new species of Panicum from New Jersey. Rhodora 63 (752): 235-236.

SPECIES Panicum hirstii Swallen. Hirst's panic-grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: drainage of habitat would be detrimental!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Panicum hirstii Swallen



245
POACEAE

Panicum lithophilum Swallen ¹¹ Swallen's panic-grass

Technical Description

Annual, often tufted, panic-grass with a shallow, diffuse root system.

Culms.--Highly variable in height, depending on fertility of site, moisture, ranging from 1.5-6.0 dm tall, few-to-several per clump, erect to ascending or spreading, slender, teretish, low-ribbed, purplish-tinted proximally, pilose at the nodes.

Leaves.--Concentrated toward the culm base, but none forming overwintering rosettes, the lowest smallest, usually withered by flowering time, the largest with sheathes 3-4 cm long, these narrowly tubular, strongly ribbed, pilose, with hair bases on ribs strumose, splitting apically; ligule a ring of hairs ca. 3-4 mm long; blades ascending to erect, mostly 6-10 cm long, 3-5 mm wide, linear, flat, and tapering very gradually from below the middle to the narrowly pointed apex, the margin proximally strumose-ciliate, the surface yellow-green or strongly maroon-tinged, the upper side pilose, the lower surface smooth or pilose toward the base.

Inflorescence.--Spikelets ellipsoidal, acute, ca. 1.9-2.3 mm long, smooth, green, variously tinted with maroon or purple, arranged diffusely in an ellipsoidal or ovoid panicle 1/3 or less the total plant length, on shortish, ascending or erect stalks toward the tips of the slender, purplish, minutely scabrid panicle branches. First glume ca. 1 mm long, acute, somewhat keeled at the midnerve; second glume ovate, ca. 2 mm long, the short acute tip slightly excurved or erect, the rounded back strongly ribbed; sterile lemma similar in shape to the second glume.

Fruit.--(in this case the hard fertile lemma and palea!) plano-convex, ellipsoidal, apiculate, pale green, shining, ca. 2 mm long or nearly equalling spikelet, not pointed beyond it.

Distribution and Flowering Season

Granite outcrops and their immediate surroundings, Piedmont South Carolina, Georgia, Alabama. Flowering from August to frost.

Special Identifying Features

P. lithophilum is in that part of the sect. "Capillaria" that has spikelets under 2.5 mm long and panicles that rarely exceed 1/3 of the plant length. This thus relates it to P. gattingeri, P. philadelphicum in the southeastern U.S.A. It is distinguished from the former by its less plump spikelets,

its narrower leaf blades; it is distinguished from the latter by its longer spikelets and purplish-tinged foliage.

Habitat and Management Implications

P. lithophilum often forms stands on and around granite outcrops in full sun or light shade, usually where there have been vernal pools or inwash depressions. Thus its new leaves are arising at the time when Diamorpha, Sedum, Arenaria, Isoetes, Agrostis elliottiana, Juncus, Lindernia and other ephemerals are carpeting such places. By the time the Panicum is fruiting it is usually admixed with such plants as Viguiera porteri, Crotonopsis elliptica, Cyperus granitophilus, Talinum, Hypericum gentianoides, Bulbostylis capillaris, etc., and in some instances may be the dominant plant. In nature it falls well within that class of pioneer species that invades the granite, ultimately giving way to perennial herbs and finally to invading shrubs and trees, these last at first being mostly gymnosperms such as Juniperus, Pinus echinata, P. virginiana, P. taeda, which in turn give way to upland hardwood species. The site quality for pines or hardwoods is usually poor until the underlying granite is covered by considerable depth of soil, and fire has been a historical factor in helping keep granite glades open. Mainly the threat to this particular grass is from quarrying of the granite, together with careless trampling or driving over the outcrop pools. However, this is a weedy species which can resist such pressures better than most of its associates. Much of it now exists in protected state land in Georgia.

References

- Hitchcock, A. S. & Agnes Chase. 1950. Manual of the grasses of the United States, ed. 2, pp. 687-689. U.S.D.A. Misc. Publ. 200. U. S. Govt. Printing Office, Washington, D.C.
- Radford, A. E., C. R. Bell & H. E. Ahles. 1968. Manual of the vascular flora of the Carolinas, pp. 142-159. Chapel Hill, N.C.

SPECIES Panicum lithophilum Swallen. Swallen's panic-grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			NA	
Damage								
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Panicum lithophilum Swallen



245
POACEAE

100

Panicum nudicaule Vasey [1-5].

Status: Threatened

Technical Description:

Tufted perennial Dichantherium, the vernal culms therefore arising from a strong overwintering rosette.

Culms: Vernal culms erect, mostly 2-5 dm long, slender but stiffish even though soft, terete and multiribbed, the internodes few, shortest and crowded toward plant base, elongated upculm, therefore leaves concentrated toward base.
Leaves: Rosette leaves largest, with short, loose, loosely pilose sheathes, with blades lance-linear to elliptic-linear, 5-15 cm long, 0.5-1.2 cm wide, narrowly acute, the margin smooth, a narrow, pale, thin band; ligule a narrow band of white, erect hairs to 0.4 mm long; upper and lower blade surfaces smooth, bright yellow-green, sometimes tinged with maroon, the lower surface finely but prominently ribbed, the upper surface ribs inconspicuous; lower culm leaves similar to and but slightly smaller than those of rosette; mid-and upper culm leaves erect, abruptly much smaller, distant, and few.
Inflorescence: Spikelets numerous in a diffuse, broadly ovoid panicle mostly 4-8 cm long, the sinuous slender branches widely ascending, pale green with tints of maroon, minutely scabrid, the peduncle of the panicle usually well extended above the uppermost culm leaf.
Spikelets: glabrous, on pedicels of varying length, ellipsoidal to lance-ovoid, 2.8-3.0 mm long, pale green or tinged with purple, the first glume ca. 1 mm long, broadly to narrowly ovate, very thin with only the mid-nerve prominent, the second glume ca. 2.5 mm long, lanceolate, acute and apiculate, pointed beyond the fruit, the back prominently but widely nerved; sterile lemma slightly shorter than to as long as the second glume and similar to it; fruit (fertile lemma, palea and enclosed grain) plano-convex (convex backed, flat on side of fertile palea), narrowly ovoid, ca. 2 mm long, pale green, smooth and lustrous.

Distribution and Flowering Season:

Acid organic sands, peaty or silty muck of open stream and river bottoms, seep bogs, wet savanna, Gulf Coastal Plain, western Florida west into southern Mississippi; vernal culms flowering from late April through May; autumnal culms presumably flowering from mid-summer to frost.

Special Identifying Features:

Most Dichantherium panicums have hairy spikelets. This one does not, and can be distinguished readily from the others that do not by a combination of short ligule, leaves crowded toward plant base. Of those in this complex that have rather large spikelets with second glume and sterile lemma pointed beyond the fruit (P. scabriusculum, P. cryptanthum, P. yadkinense) the first has hispid and

spreading (rather than pilose and ascending) sheath hairs and is a taller plant; the second and third are taller and somewhat more slender plants with smooth sheathes, and the second has smaller (1.5 mm) fruit.

Habitat and Management Implication:

This rare grass is most frequent in boggy sites or acidic openings in the titi dominated woods along streams, is on wet peaty or silty sandy substrates that are frequently flooded. It, like most other wet savanna and bog herbs and grasses, is a plant of full sun, thus is suppressed by invasion of shrub and overstory woody species, increases with release through fire or timbering if this is unaccompanied by soil disturbance or draining. It is eliminated if the land is drained and is either strongly reduced or totally eliminated by most site preparatory methods, with bedding perhaps being the least damaging.

References:

- Hitchcock, A.S. & Agnes Chase. 1950. Manual of the grasses of the United States, Ed. 2 (revised by A. Chase). U.S.D.A. Misc. Publ. 200. U.S.Govt. Printing Office.
- Small, J.K. 1933. Manual of the southeastern flora, p. 73.
- Vasey, George. 1889. P. nudicaule in U.S.Dept. Agr.Div. Bot. Bull. 8: 31.

SPECIES: Panicum nudicaule Vasey

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Drainage destroys the habitat!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Range of:

Panicum nudicaule Vasey



245
POACEAE

100

→ Sporobolus teretifolius Harper [i-6]

Status: Threatened

Technical Description:

Strongly tufted, wirey-leaved-and-culmed perennial grass 6-10 dm tall, increasing by compact-compressed lateral-basal offshoots, the roots rather thick, diffuse-fibrous.

Culms: erect to ascending, straight and slender but rather stiff, terete, smooth, pale yellow-green.

Leaves: crowded toward culm base, few, shorter and more distant upward on culm, the longest, including sheath, ca. $1/2$ the plant height, the older sheath bases persisting as a stubble of chaff and fibers, the fresh sheath about $1/3$ the leaf length, firm, flavescent with red or purple tinges distally, toward base broad and clasping with thin, paler, hyaline margin, the back rounded, low-ribbed, gradually tapering into the blade, there silvery pilose, the blades filiform, erectish or slightly spreading, medially and basally flat or somewhat inrolled with a narrow, slightly thickened, minutely scabrid margin and ca. 1-2 mm wide, above middle strongly folded so as to be terete or oval in cross section, or terete from base to tip, always finely low-nerved, always smooth, narrowing very slightly to a narrow, bluntish, scabrid tip.

Inflorescence: spikelets very many in a diffuse panicle of numerous subwhorled or alternate, smooth, primary branches with pilose or pilosulous axillae, the peduncles slender, narrowly clavate, ascending, the whole inflorescence in outline elliptical, lance-ovate or narrowly ovate, 2-4 dm long.

Spikelets: Glumes 2, lanceolate, straw-colored or purplish-brown, the first 2.5-3.0 mm long, the second 4.5-5.0 (-5.5) mm long, narrowly acute, chaffy, the backs proximally rounded, distally somewhat keeled, only the midnerve evident; fertile florets 1 (not even a vestigial rachilla joint evident!), ca. 3 mm long, the lemma and palea subequal, oblong-lanceolate, acute, with narrowed but bluntish tips, smooth, folded but not keeled, the back of the palea with a longitudinal groove; stamens 3, the anthers linear-oblong, purplish, ca. 3 mm long.

Fruit: caryopsis cylindrical-oblong, ca. 2.5 mm long.

Distribution and Flowering Season:

moist to wet pineland savanna and hillside seep bogs, Coastal Plain, eastern North Carolina; Georgia in the Altamaha Grit region; flowering from September into October.

Special Identifying Features:

Of the perennial, tufted dropseeds frequenting the southeastern

Coastal Plain and having diffuse inflorescences there are but two with which this one could be confused, namely S. floridanus and S. curtisii. The former is a taller, coarser grass with leaves tending to be flat and much broader (to 5 mm) and having subequal glumes; the latter, while it has narrow leaves that tend sometimes to be involute, has darker colored spikelets whose erect, short peduncles tend to be nearly appressed to the panicle branches; it too has subequal glumes and spikelets that do not exceed 4 mm in length.

Habitat and Management Implication:

S. teretifolius frequents moist or even wet pinelands, its dense tufts with bases set fairly deeply in a black sandy peat. It is part of a grass-sedge bog type that includes such associates as Andropogon, Aristida, Panicum, Paspalum, Ctenium, many Rhynchospora, Scleria, Fimbristylis, Dichromena latifolia, bog Eleocharis and Carex, Juncus, particularly J. canadensis, J. trigonocarpus, Eriocaulon, Lachnocaulon, Syngonanthus, many Xyris, Habenaria, Lilium catesbaei, Zygadenus, Sabatia, many Polygala, Lobelia, Oxypolis rigidior and O. filiformis, Eryngium integrifolium, and a wealth of showy composites in Coreopsis, Liatris, Helianthus, Balduina, Bigelowia, etc. The overstory is usually dominated by Longleaf Pine, with scattered Pond Cypress, Pond Pine, Virginia Bay, Red Bay, Red Maple, Nyssa biflora (N. ogeche in Georgia), etc. The shrub layer is made up of gallberry, Wild Azalea, various blueberry and huckleberry, Staggerbush, Fetterbush, Sweet Pepperbush, Zenobia. Cyrilla forms broad belts in the lower areas and in Georgia there may be large patches of Serenoa. Smilax, particularly S. laurifolia, and various Rubus, together with Arundinaria form dense growths locally. Frequent natural woods fires were paramount historically in establishing the openings dominated by grass-sedge, in that they reduced the shrub and tree competition; conversely, fire protection results in increase of woody vegetation, this ultimately replacing the herbs.

The greatest threat to S. teretifolius habitat comes from grand-scale pine monoculture with huge tracts of low savanna being first drained, then mechanically site-prepared for Slash Pine. The result is a drier, ultimately shadier site which will not support this grass. Other tracts are being drained and cleared either for improved pasture or for row crop agriculture.

References:

- Harper, R.M. 1906. Sporobolus teretifolius Harper in Bull. Torr. Bot. Club 33: 229.
- Hitchcock, A.S. 1950. Manual of the grasses of the United States, ed. 2, revised by Agnes Chase: U.S.D.A. Misc. Publ. 200: Sporobolus, pp. 413-432.

SPECIES: Sporobolus teretifolius R.M.Harper

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Do not drain site!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Known Distribution of:
Sporobolus teretifolius Harper



CYPERACEAE

Carex amplisquama F. J. Hermann, Fort Mountain sedge, Sedge

Technical Description

The plants in small to large tufts, the bases leafy, covered by the fibrous remnants of old leaf bases, increasing by elongate slender stoloniferous rhizomes, these covered by shreddy-fibrous narrow, rhizome-scales.
Leaves.--Narrowly linear, 2-3 dm long, 1-2 mm broad, pale yellow-green tapering-tipped, the margins scabrous; sheathes whitish, the apex thin but firm.
Inflorescence.--Scapes slender, not much longer than the longer leaves, about 0.5 mm thick, longitudinally several-ridged, erect or arching outward. Lateral spikes strictly female, (1-) 2-3, ovoid, few-flowered, rather distant at the scape tips, the lowest with an essentially sheatheless, lance-linear, subulate bract up to 1.5 cm long, or this bract reduced, the uppermost with lowest bract shorter than the spike. Fertile female scales ovate, boat-shaped, hiding perigynes, about 3mm long, smooth acute or retuse, the margins thin, pale or greenish, the backs with a broad maroon median zone and a greenish, raised midrib, this projecting as a mucro beyond the scale tip. Perigynes about 3 mm long, the body broadly obovoid, short-stipitate, hairy, pale green, closely filled by the akene, abruptly narrowing to an oblique-tipped, mainly toothless, narrow beak about 1 mm long. Male spike short-stalked or nearly sessile, linear, 1.0-1.5 cm long, the scales narrowly ovate or oblong, acute, smooth, each with thin pale margins and a broad maroon median band, this with a whitish or pale tan raised midrib which may or may not project as a mucro.

Distribution and Flowering Season

Thus far known only from dryish sandy or rocky clearings toward or at summit of Fort Mountain, in Gilmer and Murray counties, Georgia. Flowering in late April and early May.

Special Identifying Features

This species is a part of the "Montanae" complex and is chiefly to be distinguished by its combination of a stoloniferous-rhizomatous habit with its broadish, greenish-midribbed female bracts. It is nearest C. pensylvanica in appearance and there is some question as to whether it is different from some other species in the complex.

Habitat and Management Implication

The summit of Fort Mountain occupied by this sedge has dryish, acidic sandy and rocky soil and is forested chiefly by mixed oak-pine (Virginia pine, white pines with an a mixture of sweet birch, tulip poplar, red maple, hard maple. The shrub layer is mostly ericaceous, with several species of Rhododendron, Sourwood, Vaccinium, Gaylussacia. The Carex is found in the thin shade of open forest, in moist sandy-gravelly clearings therein, or on gravelly slopes beside the highway itself. Thus, within its small area, it is found either in shade or in full sunlight. Most

robust growth appears where the overstory has been thinned by previous logging. One large part of what appears to have been former area for it has had all forest removed, has had some plowing, and has gone over largely to grass (Danthonia, Aristida, Andropogon, Panicum). It is not to be found in this large cleared place. The range of this species is so restricted and collections so few (outside the type and my own) that no substantial information on the species is as yet available.

Reference

Hermann, F. J. 1955. *Rhodora* 57: 157. (This is a description of the type!)

SPECIES: #23 Carex amplisquama F. J. Hermann Sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage	X					X		
No Lasting Effect								X
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex amplisquama F. J. Hermann



245
CYPERACEAE!→ Carex baltzellii Chapm. ex Dewey, Baltzell's sedge; Sedge

Technical Description

Perennial, forming tufts from spreading-ascending, scaly, fibrous rhizomes.

Leaves and Shoots.--Numerous per tuft, linear, the longest to 6 dm long, 0.5-1.0 cm broad, pale green, somewhat spreading, scabrous along the raised veins, firm, spreading, and overwintering, gradually tapering at the apex, the bases pale or straw colored. Fertile shoots up to 30 cm tall, thus exceeded by foliage leaves and forming in late winter or early spring, shorter-leaved with the lower and outer-most scale-like and pale or pale brown.

Inflorescence.--Spikes 3-5, on erect or ascending, long stalks, the lower ones often obscured in bracteal and foliage leaves, linear-cylindrical, 3-5 cm long, the terminal spike longest-stalked and exclusively of male florets, the bracts of which closely overlap, are obovate, with broadly rounded or almost truncate apices and are a rich reddish brown save for a strong, pale midnerve, this projecting as a strong mucro. Lateral spikes entirely female or female below, male at the tips.

Florets.--The bracts of the female florets also strongly overlap, hide all but the tips of the florets, and have the same shape and color as the male. The fruiting female perigynia (covering of the fruit) narrowly obovoid, about 4 mm long, tight, narrowing gradually to the base, apically to an erect, oblique and toothless beak; the body is obscurely trigonous, finely hairy, with many fine but strongly raised ribs.

Fruit.--Ripe akene dark brown, trigonous, with a short stalk.

Distribution and Flowering Season

This rare species is found in mesic sandy loamy ravines in the lower Coastal Plain in northwestern Florida, southeastern Alabama and southwestern Georgia. It begins bloom in February, fruits in April.

Special Identifying Features

Taxonomically this is closest to a more northerly sedge, C. pedunculata, which has narrower but shorter leaves, shorter spikes with fewer florets, and purplish or brownish culm bases. Superficially, and in range it is closest to C. picta Steud. in general appearance of the plant, in leaf, and in shape and color of spikes. However, this latter species is one of the few Carex which produces unisexual plants; its bases are usually reddish-tinted, its spike bracts, while strongly red-brown tinted lack the strong mucro produced by C. baltzellii.

Habitats and Management Implication

C. baltzellii is always found on moist, well-drained, humified fine sands in steep ravines whose slopes are forested with Magnolia grandiflora, Fagus, Acer saccharum (southern vars.), Nyssa sylvatica, Cornus florida, Liriodendron,

together with occasional Pinus glabra, P. taeda. The acid sands it favors are also populated with such spring flowering forbs as Hexastylis, various Trillium species, Uvularia, Viola etc., together with an abundance of other species of Carex. It has not yet been found in areas where logging has removed the dense overstory or where heavy grazing has occurred, which would lead collectors to conclude that it responds negatively to heavy or clear-cutting and grazing. It is nowhere a common plant, being known for years only from its type locality in the Apalachicola bluff country of northwestern Florida.

Reference

Small, J. K. 1933. Manual of the Southeastern Flora. 213.

SPECIES: #24 Carex baltzellii Chapm. ex Dewey, Sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X		
Damage								
No Lasting Effect	NA						NA	X
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex baltzellii Chapm. ex Dew.



245
CYPERACEAE

→ Carex biltmoreana Mackenzie, ^{E-51} ~~Biltmore sedge~~

Technical Description

Fibrous-rooted, loosely short-stoloniferous, smooth, caespitose perennial sedge.

Culms.--Tufted, some sterile, some fertile, the decumbent bases often stoloniferous, usually purplish, cloaked by numerous overlapping sheaths, the older ones (and those of previous years) fibrillose, the fertile ones 3-9 dm high, equalled or overtopped by leaf tips, the bases stoutish (to 5 mm thick) but distally slender, sharply angulate, the angles scabrid.

Leaves.--Numerous, strongly overlapping toward culm base, more distant upward on culm, the lowest scale-like or mostly sheath, often fibrillose with age, the longest with sheaths prominent, the rounded backs strongly ribbed, green, purplish proximally, the ventral side scarious, white, truncate or oblique at apex; larger leaf blades flat or slightly revolute, lineal, the widest 5-7 mm broad, strongly nerved, scabrid along the larger nerves and on the margin, the apex strongly tapering, harsh.

Spikes.--Male (staminate) spike lineal, 2-3 cm long, overtopping the uppermost (female) spike, the densely overlapping bracts scarious, oblong, 4-5 mm long, apically obtuse or rounded, marginally pale, submarginally with a broad reddish-brown band, medially around the midrib pale or greenish; anthers pale, ellipsoidal, ca. 1 mm long, exserted on filiform filaments. Female spikes 2 or 3, rather distant, the ultimate one with few florets, thus short, directly subtending the short to elongate (2-3 cm) peduncle of the male spike and subtended by a short-sheathed, setaceous-bladed bract, the lowest spike longest, narrowly linear but erect, mostly 2-4 cm long, the numerous florets crowded at spike tip, scattered and distant toward its base, the peduncle 2-3 cm long, mostly invested by the sheath of the subtending bract, this with sheath and blade similar to upper foliage leaves and often exceeding the staminate inflorescence; female scales scarious, broadly elliptic or oblong-elliptic, ca. 3 mm long, the narrow edge pale, whitish, the convex back otherwise reddish-brown save for a greenish midzone made up of 3 nerves, the apex rounded or obtuse; perigynium obovoid, tightly filled below the apex by the tumid akene, strongly raised-nerved, smooth, green, the very short beak bent abruptly back and appressed to the perigynial summit, its orifice entire, oblique.

Akene.--Plumply trigonous, 2.0-2.3 mm long, the rounded angles pale, the intervals somewhat convex, reddish-brown, smooth.

Distribution and Flowering Season

Seeps over and moist rocky woods around granite extrusions, Blue Ridge, southern North Carolina and adjacent Georgia and South Carolina; flowering in April, fruiting in May.

Special Identifying Features

C. biltmoreana, by a combination of several spikes/culm, the female below the single male, prominent bract sheaths, trigonous fruit with perigynes raised-nerved and perigynial beak short, bent, entire, fits well into the section Paniceae, which is stoloniferous unlike most of the related section Laxiflorae. Within the Paniceae, C. biltmoreana is closest to the rare and montane C. woodii (C. tetanica var. woodii) but that plant has far more slender stolons, much narrower leaf blades, smaller perigynes, and tends to form very large clones, even turfs. Actually there is no other Appalachian Carex that quite resembles C. biltmoreana, which in the field exhibits strong tufts of purplish-based, erect leaves, these arising from mats of browning old leaves and leaf bases of previous seasons, and the somewhat spreading, even nodding leafy fertile culms with their reddish-brown-tinted male and female bractlets.

Habitat and Management Implications

C. biltmoreana is usually found in very steep, granitic sites. Commonly it grows in full sun or slight shade in seeps over masses of extruding granite, thus its roots are almost always wet. Common associated grasses and sedges are Carex muricata, C. atlantica, C. scabrata, Scirpus polyphyllus, S. expansus, Eleocharis, Rhynchospora (mostly R. capitellata), Poa, Trisetum, Sphenopholis, Glyceria. Juncus is common. Sphagnum and other wet ground mosses form part of the mat it roots in. Hedyotis serpyllifolia, Krigia montana, Rhexia virginica, Ludwigia are frequent herbaceous associates, together with numerous rosettes of wetland Aster and Solidago. The overstory, where present, is mostly oak-pine-hemlock and the understory heavy with Rhododendron maximum, R. catawbiense, R. minus, R. calendulaceum, Gaylussacia ursina, Leucothoe, Lyonia, Vaccinium, etc. C. biltmoreana is perhaps the most rare of southern Appalachian carices, but within its small range is often overlooked because of the difficult terrain it grows in. I have seen it in places where a climbing rope is necessary to reach the plants with any feeling of security.

The species probably is rare, but nonetheless safer than are many other more abundant species in that the steep country in

which it grows is not easily logged, the sites are poor for timber overall, the opportunity for exploitation of the rugged landscape for forestry or for residential or commercial purpose is slight. It is not likely to lose much habitat in future years save through some accidental factor that would alter the massive granites it grows upon.

References

- Mackenzie, K. K. 1940. North American cariceae, Vol. II. nos. 277-278. New York Botanical Garden.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 214-215. Chapel Hill, N.C.

SPECIES Carex biltmoreana Mackenzie. Biltmore's sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			NA	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex biltmoreana Mackenzie



CYPERACEAE;

Carex chapmannii Steud. Chapman's sedge, Sedge

Technical Description

Perennial smooth sedge forming small to large tufts, these increasing by means of slender, spreading stolons.

Culms.--Erect from spreading, upwardly arching bases, the lower part leafy, slender, rather weak, outwardly arching, somewhat flattened and also strongly ribbed, long-sheathed, 1 rib scabrid, with most of the culm leaves subtending spikes.

Leaves.--The lowest leaves scale-like, mostly sheath, pale to dark brown. Larger foliage leaves mostly 2-3 dm long, the sheathes pale, very thin on the inner face, the outer face strongly ribbed, the blades dark green, thin, linear, tapering, lax, mostly 3-4 mm broad, strongly nerved beneath, the margin downwardly scabrid.

Inflorescence and Florets.--Lateral spikes exclusively female, the lowermost usually hidden in the clump leaves, all few-flowered, the florets either close together or with the lowermost well separate on the spike axis. Stalks of lowermost female spikes elongate, up to 8-10 cm long, very slender, weak; stalks of uppermost spikes much shorter, progressively reduced as are the subtending leafy bracts. Fertile female scales elliptic to broadly lanceolate with thin white sides and a broad, green mid-rib zone, this projecting beyond the bract tip as a flattish, green mucro. Perigynia 4-5 mm long, longer than the fertile bracts, fusiform (spindle shaped), the body with several raised nerves (2 strongly raised), yellow-green, smooth, gradually narrowing into a prominent, erect or outcurved, toothless beak. Male spikes 1.5-2.5 cm long, linear, the male bracts similar in outline and midrib to the female, short-stalked to nearly sessile, the uppermost female spike usually just beneath, its bract not overtopping.

Distribution and Flowering Season

Sandy hammocks, in the Coastal Plain, from eastern North Carolina southward and westward through northwestern Florida. Flowering in March and April fruiting through May.

Special Identifying Features

This species is in the section Paniceae, in the manuals difficult to distinguish from the closely related Laxiflorae. It is distinguished primarily for its elongate stoloniferous rhizomes projecting from the clum, its brownish culm bases, its rather long perigynes with their (usually) outcurved beaks.

Habitats and Management Implication

It frequents well-drained hammock woodlands or cleared areas of these, and is always on sands or sandy loams. A typical situation would be beech-magnolia-southern hard maple or red maple with some admixture of oak and pine. Usually it is in association with several other Carex, particularly C. laxiflora (vars.), C. dasycarpa, C. crebriflora, C. digitalis, etc. and grasses such as Uniola

and various panicums. Logging disturbance, unless accompanied by extremes of erosion or heavy grazing, usually does not affect abundance.

References

Radford, A. E. et al. 1968. Manual of the vascular flora of the carolina, pp. 234.

Small, J. K. 1933. Manual of the southeastern flora, pp. 214-215.

SPECIES: #25 Carex chapmannii Steud. Sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X		X		
Damage			X					X
No Lasting Effect	NA							
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex chapmanii Steudel



CYPERACEAE

Carex latebracteata Waterfall ^{E. A.} Waterfall's sedge

Technical Description

Tufted, smooth perennial sedge from a fibrous root system.

Culms.--Both fertile and non-flowering leafy offshoots produced, usually in large tufts, the culm bases covered by sheathes of the erect leaves, the peduncle strongly triangular, strongly wing-angled, the pale wing minutely scabrid-edged, to 3 dm long, usually overtopped by the leaves.

Leaves.--Lowermost (outer) leaves primarily sheathing, scale-like, straw-colored, essentially bladeless; full sized foliage leaves 3-5 dm long, erect or ascending, the sheaths pale green, soft, the margins broad, scarious, inrolled, red-dotted, convergent apically to form a scarious, prominent, obtuse to acutish ligule, or auriculate apically; leaf blades linear, tapering gradually at the apex, the larger ones fully 1 cm broad, pale green, blue-green or often glaucous, multinerved, the medial nerve prominently raised beneath, the marginals pale, broadish, serrulate, making a conspicuous border.

Inflorescence.--Spikes solitary and terminal, the basal portion female, terminally male; female bracts of two sorts, the lower 5-6 leaflike, asymmetrically keeled at their bases, longer than the whole spike and concealing it, erect, sheathless, the lowermost longest, (3-) 4-8 (-10) cm long, linear-elliptic, caudate or cuspidate, similar in character to foliage leaf blades, and often sterile, these bracts progressively shortening at each node of the spike rachis, each subtending a female floret, thence abruptly 16 shortening to pale, whitish, broadly obovate, scarious, rounded female bracts shorter than the perigynal body, each with a narrow, arced, transverse band distally and ca. 2.5-3.0 mm long; male bracts few, tightly imbricate, similar to upper female bracts.

Florets.--Female floret with style long-exserted, reddish-brown, strongly papillose, the stigmas 3, short-linear, excurved; male floret with anthers ca. 2 mm long.

Fruit.--Ripe perigynes ca. 8 mm long, the body obpyriform, ca. 5 mm long, tightly filled by the akene, somewhat triangular at the narrowed base, obscurely so or entirely tumid above, smooth, thence abruptly narrowed to a narrowly triangular, deeply and obliquely slit, scarious-orificed beak; perigynal surface with 1-3 strongly raised, continuous nerves, several less-raised incomplete nerves, and several finely impressed longitudinal nerves, white. Akene broadly obovoid, obscurely trigonous, ca. 3 mm long, the angles broadly rounded, the intervals convex, the surface minutely cancellate, pale greenish-white.

Distribution and Flowering Season

Rocky, open-forested, hardwood slopes and ravines, bluffs, south-

eastern Oklahoma and southwestern Arkansas; flowering in April and May.

Special Identifying Features

The single androgynous spike concealed by large, spathe-like bracts, combined with smooth perigynes, basally joined male bracts, and the style base jointed directly to a blunt akene apex all place this Carex in section Phyllostachyae, which in North America has but four other species. Only two of these, C. jamesii Schw. and C. willdenovii Schk., are widespread in the southeastern U.S.; both are narrower leaved and lack the broad, strongly concealing, lower female bracts. Thus this species is more similar to C. backii Boott and C. saximontana Mackenzie, the former inhabiting dryish woods and clearings from New England and southern Canada westward to British Columbia and Wyoming, the latter on dryish hillsides, usually under pines, from western Minnesota and Manitoba westward to Oregon and British Columbia. However, C. latebracteata has only the lower female bracts leaf-like, while in C. backii all are leaflike. Therefore C. latebracteata is closest to C. saximontana but differs (a.) in having much larger perigynes (b.) in its more robust habit and (c.) in its longer, broader leaves.

Habitat and Management Implications

Carex latebracteata is locally abundant along the stream systems of the Ouachita mountain area of southeastern Oklahoma and southwestern Arkansas. It may be found usually on steep slopes and bluffs under Pinus echinata-mixed hardwood, mesic hardwood, oak-hickory, or in natural or artificial clearings thereof. The soil is shallow to deep, the common parent materials being from shale, calcareous rock, or novaculite, is usually a sandy loam, clay loam, or sandy clay loam. The overstory may range from dense forest to quite open stands and some common woodland herbaceous associates are Dentaria, Hepatica, Sanguinaria, Corydalis flavula, Thaspium barbinode, other carices, Dodecatheon meadia, Valeriana-palmeri, Streptanthus squamiformis, Phlox pilosa, Monarda russelliana, M. bradburiana, Scutellaria parvula, Penstemon arkansana, Silene virginica, Phacelia hirsuta, etc. In evidence are also many Panicum, Melica, Bromus purgans. Thus, some herbaceous associates are those of open dry woodlands and clearings, others of moist, rich, loamy woodlands, an indication that this sedge is rather ample ecologically. While the plants are best developed in shade, they appear to persist in artificial clearings such as made for powerlines or roads, or in very open steep poor woodlands over thin-bedded shale talus. They are eliminated by mechanical site preparation methods where the soil is radically disturbed, and none are seen where the forest was a mixed type but has become plantation pineland. The principal threat to the species appears to be in the conversion of woodlands to plantation pineland, or with the cutting down of hardwood

or pine-hardwood for conversion of the land to crop agriculture or grazing. However, the steepness of the terrain inhabited by much of this species and the relatively low quality of the timber, plus much of its acreage being in state park or National forest, give it a good chance of survival.

References

Hermann, F. J. 1970. Manual of the Carices of the rocky mountains and Colorado Basin. U. S. D. A. Agric. Handb. 374.

Waterfall, U. T. 1954. A new species of Carex (Sect. Phyllostachyae) from Oklahoma. Rhodora 56: 21-23.

SPECIES Carex latebracteata Waterfall's Waterfall's sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	x
Damage		X	X	X		X		
No Lasting Effect	X				X			
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex latebracteata Waterfall



245
Cyperaceae

Carex misera Buckl. ^(T-2) Wretched sedge

Technical Description

Densely tufted, perennial sedge, increasing by short, scaly lateral offshoots.

Culms.--Both sterile and fertile present in a clump; the growth slender, at first erect, then lax and drooping, mostly 2-4 dm long, proximally enfolded by sheathes, above these narrowly linear, sharply triangular, scabrid-hispidulous along the edges, dark green, ribbed in the intervals.

Leaves.--Numerous, crowded toward shoot base, the lowest scale-like, mostly sheath, purplish-red; foliage leaves with sheaths elongate-tubular, closed, the backs sparsely to copiously hirtellous, strongly ribbed, pale green, toward base reddish, the ventral (inner) side thinner, paler, and smoothish; ligule narrow, erect, scarious, ciliate; leaf blades narrowly linear, 1.0-1.5 mm wide, tapering-tipped, the upper surface, particularly toward the base, pilosulous, the lower surface less so or smooth.

Inflorescence.--Spikes usually 3 or 4, the uppermost exclusively male, the lower 2 or 3 exclusively female, the lowest subtended by a sheathless blade similar to a foliage leaf but shorter, its tip reaching to just below or just beyond the tip of the male spike; male spike on a peduncle 2-3 cm long, narrowly elliptic-linear, reddish, 1.5-2.0 cm long, the bracts tightly overlapping; female spikes narrowly linear, the uppermost shortest and most compact, the florets overlapping in a loose spiral, the lowermost long-pedunculate, more elongated, to 2.5 cm long, with the lowermost florets distant.

Florets.--Male flore with bracts oblong, ca. 4 mm long, apically obtuse or narrowly rounded, sometimes apiculate, scarious, reddish-brown, the midnerve and medial band green or dark, dull brown; female bracts elliptical to lanceolate or lance-ovate, 2.5-3.5 mm long, acute to acuminate, scarious, reddish-brown and with or without a pale border, the midnerve and medial zone green; perigynia narrowly fusiform, ca. 4-5 mm long, 3-angled, the interfaces nearly flat and angles rounded, with few nerves, only 2 continuous from base to apex, the beak essentially toothless, short, hispidulous around the truncated orifice.

Fruit.--Akene trigonous, in outline oblong-ellipsoidal, ca. 2 mm long, with an apical apiculus (style base) ca. 0.3 mm long, the interfaces slightly convex, the surface smooth, pale brown, the base narrowed, but definitely not stipitate.

Distribution and Flowering Season

Shaded or (rarely) sunny granitic rock faces and cliffs, Blue Ridge, eastern Tennessee and western North Carolina south into northern Georgia; fruiting (and this is the only time one collects Carex for determination!) in May and June.

Special Identifying Features

This species is distinguished from other "Gracillimae" by its combination of lax habit, hairy, narrow leaves, reddish-tinted male and female scales, and its exclusively male terminal spike, together with the sheathless lower inflorescence bract.

Habitat and Management Implications

Carex misera is usually found in moist to wet, shaded, moss-carpeted seeps over acid rock, this usually granite or metamorphosed granite. Usually it is not far from summit elevations in the Blue Ridge, thus may be under evergreens such as red spruce, balsam, white pine, hemlock, or under a mixture of hardwoods, particularly oaks, yellow-birch, red and sugar maple, buckeye, basswood, etc. The understory is mainly occupied by ericaceous shrubs, particularly various Rhododendron (both evergreen and "Azalea" types), Lyonia, Gaylussacia (mostly G. ursina), Menziesia, etc. Generally, on the rock faces its associates other than bryophytes are many ferns, other Carex, grasses, various saxifrages, Mitchella, Krigia montana, etc. I have been informed that sometimes tufts of this species may develop on seepage over rock that has been exposed in process of road cutting, but have experience with it only from shaded, undisturbed sites. Removal of the forest overstory that helps to keep the rock faces shaded, cool and moist is bound to have a traumatic effect on such plants as C. misera, at the very least tending to dry out the habitat to the point where it would be detrimental.

References

- Mackenzie, K. K. 1940. North American Cariceae II: caption and plate 332. New York Botanical Garden.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 191-235. Chapel Hill, N.C.

SPECIES Carex misera Buckley: Wretched sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA			NA	
Damage					X	X		X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex misera Buckley



245
CYPERACEAE

100
P-V.
Carex purpurifera Mackenzie, purple sedge; Sedge
C. laxiflora Lam. var. purpurifera (Mackenzie) Gleason

Technical Description

Perennial, in small tufts, the stem and sheath bases a deep purplish brown.
Culms and Leaves.--Two sorts of offshoots produced from a clump; one consists of leaves only, the lowest (outermost) mostly much shorter, mostly sheath, mostly purplish, the uppermost longest, mostly 30-50 cm long, to 1 cm broad, linear, tapering slenderly toward the apex, bright green, smooth save for the finely scabrous margins, longitudinally with 3-4 prominent veins and several less distinct ones. These leafy shoots overwinter. Fertile shoots produced in early spring, elongating to produce slender erect to spreading culms to 7 cm tall, these with basal, purplish, sheathing lower leaves, the leaves up the culm while longer never reaching half the length of leaves of sterile shoots, their sheathing bases often with purplish tints.

Inflorescence.--Mid to upper nodes of fertile shoots each producing a slender-stalked spike, the terminal one exclusively male-flowered, and densely cylindrical, 2.0-2.5 cm long, with the numerous, spirally imbricated (overlapping) scales ovate, acute to obtuse, strongly tinted with purplish brown with a paler midrib, smooth, entire, the spike stalk (peduncle) projecting the male spike beyond the tip of the subtending bracteal leaf. Female spikes usually several, shorter or longer than their subtending stalks but usually exceeded in length by the subtending bracteal leaf, the spike outline linear-cylindric.

Florets.--The florets with some overlap or somewhat loosely arranged along the axis. Ripe florets (with mature fruit) 3.5-4.5 mm long, asymmetrically broadly fusiform, the perigynial beak bowed outward, with 3 rounded angles and several low, raised longitudinal ribs, pale green, smooth. (The perigynium is the thin, usually greenish modified bract which covers all of the female flower except for the style tip which itself protrudes from a terminal hole in the perigynial beak or perigyne apex. Bracts of floret oval, slightly shorter or slightly longer than the florets, thin save for a thicker greenish midrib, the sides either pale or straw-colored or brownish-tinted, the apex acute, short-acuminate, or mucronate.

Distribution and Flowering Season

Carex purpurifera is found in rocky woodlands in the appalachian provinces from Kentucky and western North Carolina southward into northern Alabama. It begins to flower in March and fruiting material may be collected into early May.

Special Identifying Features

This species is a part of the sect. "Laxiflorae", one of the most difficult complexes in a difficult genus. Most are woodland species, several rather broad-leaved. Leaves of fertile shoots have both sheathes and leaf blades well developed,

with the solitary terminal spike strictly staminate. The fruiting perigynia are mostly ellipsoidal or fusiform, the short beaks with low teeth or none, the surfaces with raised longitudinal nerves. Many, like this species, produce sterile leafy offshoots which frequently overwinter. Within the complex there are several that have purplish bases (C. plantaginea, C. careyana, C. gracilescens). Of these, C. gracilescens Steud. (C. laxiflora Lam. var. gracillima (Boot.) Robins. & Fern. is nearest taxonomically differing only in its shorter perigynia, its more slender somewhat lower habit, its somewhat narrower leaves.

Habitats and Management Implication

C. purpurifera is usually found in the ecotone between rich mixed mesophytic cove woods and the largely oak - hickory of upper ravine slopes. It is often along the transition zone between calcareous underlying rock and argillaceous or sandy parent material. Very often it is amongst outcrops, in talus, or in very rocky soils in pockets of loam, always on well drained substrata and in open woods. It, together with other woodland sedges and forbs tends to be reduced or lost in clear-cut areas, probably because of a complex of factors involving too much light and heat, attendant soil erosion, and invasion of weedy forbs, vines, etc. with which it cannot compete. It is lost in grazed woodlots. Management involving the least impact on the soil and the light factor would favor it most, this management involving either selection or group selection.

References

- K. K. Mackenzie, 1935. Carex in North American Flora 18 (5):241-312
(Continuation)
- J. K. Small. 1933. Manual of the Southeastern Flora, pp. 216-218.

SPECIES: #26 *Carex purpurifera* Mackenzie Sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy						X		
Damage								X
No Lasting Effect	NA							
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Carex purpurifera Mackenzie



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CYPERACEAE

→ Cymophyllus fraseri (Andr.) Mackenzie, Fraser's sedge;
Sedge
Carex fraseri Andr.

Technical Description

Perennial, usually in large tufts of several, close-set rhizomal offshoots.
Stems and Leaves.--Each offshoot with several leaves, the lowest pale, straw-colored or nearly white toward the base, loosely sheathing the flowering shoot, cylindrical but expanding above at the pale green oblique-bluntly triangular-bladed orifice. Uppermost leaf by far the largest, its base pale, inrolled-sheathing, dilating and spreading above to a broadly linear green blade to 6 dm long and 2-5 cm broad; this blade has smooth, very finely ribbed surfaces, a thinnish, puckered margin and an acute or short-acuminate apex and persists over winter. The flowering shoot is stiffish but slender, pale green or near white, its base encased in leaf sheath, its total length less than or slightly longer than the subtending foliage leaf and at its tip bearing a single short-oblong, naked (bractless) spike about 2.0-2.5 cm long.
Inflorescence and Florets.--The base of the spike produces several spreading, broadly fusiform, whitish perigynia (as in Carex) about 5 mm long in fruit; the perigynium is thinnish, very faintly nerved. Above the middle of the spike all flowers are male, their thin oblong, acute bracts closely imbricated in several spirals, the filaments and anthers whitish and projecting beyond in flower. Female scales ovate, very thin, near-white, about as long as or distinctly shorter than the ripe perigynia.
Fruit.--Ripe akene trigonous, lustrous brown, the sides concave.

Distribution and Flowering

Rich, usually rocky woods in full shade in the mountains from eastern Kentucky, southwestern Virginia and West Virginia southward to western North Carolina and eastern Tennessee. It blooms from May to July.

Special Identifying Features

This species has no near relatives and its phylogeny is argued. At a distance it is often confused with some liliaceous plants because of its tufts of broad, brightish green leaves and particularly because of its chalk-white flowering inflorescences. Some botanists place the species in Carex, in that it does produce the perigynium.

Habitats and Management Implications

C. fraseri appears to require a highly humified, moist (though well-drained), slightly acidic substrate and a humid atmosphere. It is found in mixed-mesophytic forested or boreal-transitional forested areas that usually remain cool and humid even in summer. Generally it is at elevations of at least 2,000 ft. It is another species that responds negatively to clear-cutting, being a plant of at least semi-shade and evidently responding poorly to the admission of light and the

sort of weedy herbaceous and woody species that invade after a clear cut. It disappears from grazed woodlands.

References

M. L. Fernald. 1950. Gray's Manual of Botany, ed. 8. 293.

J. K. Small. 1933. Manual of the Southeastern Flora, pp. 235-236.

SPECIES: #27 *Cymophyllus fraseri* (Andr.) Mackenzie, Sedge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy					X			X or
Damage								X
No Lasting Effect	NA			X				
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Cymophyllus fraseri (Andr.) Mack.



245
CYPERACEAE

Cyperus granitophilus McVaugh [1-4].

Status: Threatened?

Technical Description:

Tufted, sweetly fragrant, annual sedge, the foliage smooth, the roots slender, fibrous, reddish, shallow.

Culms: erect to spreading, 3-angled, forming small dome-shaped mats, from base to spikelet clusters mostly 5-10 (-15) cm long, shorter than longer leaves, pale green, aging brown.
Leaves: in 3 ranks, all cauline but concentrated toward culm base, the longest to 17 cm long, erect or spreading, the youngest scale-like, mostly sheath; mature foliage leaves with sheathes 1/4-1/6 the blade length, much broader than blades, keeled, multiribbed with broad, thin (scarious) maroon, purplish or brownish borders or entirely reddish, converging acutely to narrowly linear blades, these gradually tapering to a narrowly acute apex, the tip keeled, the margins and midrib pale, wirelike, the nerves otherwise inconspicuous, the surfaces pale green, aging maroon or brown.
Inflorescence: spikelets numerous, sessile in a single dense, headlike hemispheric cluster or sometimes with 2-4 additional, similar, short-peduncled clusters, subtended by 4-5 linear, tapering, spreading unequal leaflike bracts, these sometimes full as long as culm leaves.
Spikelets: linear or lance-linear, 5-10 mm long, 4-5 mm wide, the bracts distichous (1 plane), many (8-12), overlapping, the fertile ones lanceolate or narrowly ovate, ca. 3 mm long, keeled, long-cuspidate, the tips ascending to somewhat spreading, the scale body thin save for the prominent (when young, greenish) midrib and the 4-5 strong lateral nerves, the whole scale aging maroon or brown; florets naked, perfect, but stamens maturing first, 1/floret, the anthers narrowly linear, nearly 1 mm long; ovary at first linear, 3-angled, the slender style branching above or at middle to 3, filiform, spreading, exerted stigmatose branches.
Fruit: Akene trigonous, mostly narrowly to broadly cuneate-obovoid ca. 0.8-1.0 mm long, the angles rounded, the apex broadly rounded, somewhat shouldered or subtruncate, the 3 faces flattish save apically where somewhat concave, the surface reddish-brown or grayish, very finely cancellate or minutely pebbled in rows.

Distribution and Flowering Season:

Edges of shallow pools or on banks of intermittent streams and seeps in, on or around sandstone or granite outcrops, Piedmont, southern Blue Ridge, Cumberlands and Interior Low Plateau, middle Tennessee east to South Carolina, south into Georgia and Alabama; flowering and fruiting from June to frost, depending on available moisture.

Special Identifying Features:

McVaugh (1937) makes a chart which has most critical differences between this and C. aristatus Rottb., the closest species to it. He notes that C. granitophilus is usually stouter, has the bract tips erectish or less spreading, the bract sides 4-5-nerved

(rather than 3 or rarely 4-nerved), the akene lacking a short tip (present in C. aristatus). He fails to note another strong difference, namely the much longer, narrower anther. The only other Cyperus with which this taxon could be confused is C. cuspidatus, a tinier weed of moist sandy waste places of the Coastal Plain and which has smaller scales whose apices are strongly notched at either side of the strongly recurved, aristate tips. Its akenes are obovoid, but not wedge-like.

Habitat and Management Implication:

C. granitophilus was assumed by McVaugh to be confined to granite outcrop areas in the Piedmont of Georgia. Since then it has been found on or around a wide variety of outcrop types in more physiographic provinces. Its standard habitat is a thin, seasonally moist or wet, inwash substrate over rock or outwash areas nearby. It is a plant of full sun, is shaded out by competing perennial herbs, and certainly by invading woody vegetation. On the outcrops its commonest associates are various bryophytes, Isoetes, Panicum lithophilum, P. flexile, Sporobolus vaginaeflorus, Crotonopsis elliptica, Talinum, Oenothera fruticosa, Portulacca, Hypericum gentianoides, Juncus georgianus and other rushes, Rhynchospora, Fimbristylis, Allium, and several showy composites including Coreopsis, Liatris microcephala, Bigelowia, Viguiera porteri, etc. It is definitely a lower successional level, pioneer plant, abundant some years when rainfall is normal, rarer during drought cycles. It has a high reproductive potential, can reach fruit from seed in a few weeks. It is in little danger on outcrops save from trampling from livestock or people, or from quarrying of the rock. In the vicinity of Atlanta however, considerable acreages of outcrop are being covered by new homes or by industrial construction.

References:

- Godfrey, R.K. & Jean Wooten. 1979. Aquatic and wetland plants of the southeastern United States. Monocotyledons. Athens.
- McVaugh, Rogers. 1937. A new species of Cyperus from the granite region of central Georgia. Castanea 2: 103, pl. 1, figs. 4-8.

SPECIES: Cyperus granitophilus McVaugh

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		NA	NA	NA			NA	
Damage No Lasting Effect	X							X
Beneficial if Done Properly					X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:

Cyperus granitophilus McVaugh



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CYPERACEAE!

Fimbristylis perpusilla Harper [5-5]

Technical Description

A low annual, rarely as tall as 8 cm.

Culms: The stems usually bunched, spreading or erect from shallow, fibrous roots.

Leaves: Mostly basal, the sheathes loose, the blades linear-filiform, often as long as the whole plant or longer, spreading, smoothish.

Inflorescence: Flowering spikes ovoid or oblong, 2-4 mm. long, borne in small umbel-like cymes at the tips of very slender stalks, the central spike usually sessile, with others on stalks of various lengths, all subtended by long, slender, leaf-like bracts. Fertile scales spirally arranged, numerous, linear-lanceolate, the slender tips somewhat spreading and giving a "bristly" look to the small spikes.

Flowers: Stamen 1. Style 2-branched above.

Fruit: Akene, cylindrical-curved, "banana"-shaped, 0.4-0.6 mm. long, finely longitudinally-and-cross-lined.

Distribution and Flowering

This species is known from pond banks in but two counties in the Coastal Plain of Georgia (Seminole, Sumter), thus may be the rarest species of sedge in the United States.

Habitats and Management Implications

F. perpusilla where found is very abundant on the silty banks of natural ponds in pine flatwoods clearings, usually where drying has produced extensive areas of mud. There a literal "fuzz" of these low plants develops. Evidently the seeds can lie dormant for extended periods. In the locality where the species was first found in great abundance it was never again located, though many have returned to the exact place over the years. In the Seminole county locality it was found in 1962 in abundance, a few plants in 1963, then none were reported until 1972 when it appeared again in great numbers. Mysteriously, though there are at least four similar ponds in the same vicinity and presumably with the same habitat, no specimens have ever been observed around these.

Obviously, this species is too poorly understood to understand how, precisely, it is to be maintained in its small niche. The most likely approach is to mark the locality then leave it alone. The area is in the karst belt, where most of

the ponds are small subsidences due to slump of underground caverns in limestone. Ecologically, the area is low savanna with a scattering of slash, longleaf and loblolly, underneath with a scattering of palmetto and gallberry but mostly with grasses and sedges. The present use of land in both areas is for pasture, an attempt being made to use the ponds as stock tanks and at the same time to convert the grass-sedge cover to palatable grasses such as bahia and bermuda. However, none of these pose a threat in that they do not occupy the mud of the pond bank. The major risk would arise from too much trampling of the pondbank by watering cattle or an actual draining of the area. F. perpusilla is a plant of full sunlight, so that establishment of a stand or plantation of pine would doubtless shade it out.

References

- Harper, R. M. 1904. Explorations of the Coastal Plain of Georgia during season of 1902. Bull. Torr. Bot. Club 31: 9-27.
- Kral, R. 1971. A treatment of Abildgaardia, Bulbostylis and Fimbristylis for North America. Sida 4 (2): 57-227.

Note: The species has been discovered in Horry County South Carolina by Mr. Steven Leonard in the fall of 1980 and reported by him the following year (Fimbristylis perpusilla Harper in South Carolina. Castanea 46 (3):235-236. 1981)) This is a very considerable extension in the known range of a very rare sedge!

Revised March 1980

SPECIES: #28 Fimbristylis perpusilla Harper

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								
No Lasting Effect								
Beneficial if Done Properly	X				X	X		X

Other Comments: Do not drain

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Fimbristylis perpusilla R. Harper



245
Cyperaceae

Rhynchospora crinipes Gale [4] Alabama beaked-rush

Technical Description

Strongly tufted, smoothish, perennial sedge.

Culms.-- Ca. 7.0-7.5 dm tall, slender, subtriangular, erect or spreading, leafy.

Leaves.-- Sheathes closed, narrowly cylindrical, ventrally brownish-scarious; blades spreading or erect, linear, flat, elongate, toward apex narrowed to triangular, scabrid tips, the margin minutely scabrid; blade width to 2 mm.

Inflorescence.-- Clusters of spikelets distant toward culm tips, the erect peduncles exserted from the closed sheathes of subtending bracteal leaves, the clusters 4-5, compact, turbinate, somewhat lobed, the uppermost exceeded by 2 or more setaceous, minutely scabrid, bracts.

Spikelets.-- Lanceolate, ca. 5 mm long, usually with 2 fertile florets and 1 sterile apical; scales lanceolate, aristulate, loosely imbricate, scarious, reddish-brown; perianth bristles 6, rigidly erect, antrorsely barbellate, reaching tubercle tip; akene body pyriform, 1.4 mm long, ca. 1 mm broad, lustrously smooth, biconvex, the somewhat flattened edges and center of akene face pale, the surface otherwise brownish, the akene base narrowed to a terete stipe ca. 0.6 mm long, this covered by white villous hairs; tubercle of akene compressed-triangular, to 0.8 mm long, grayish, its edges scabrid-hispid.

Distribution

Known only from two localities near Mobile, Mobile County, Alabama, where collected by Dr. C. Mohr in June of 1968. Has not been observed since.

Special Identifying Features

Examination of the type material at the U.S. National Museum shows, as Shirley Gale (1944) indicates, a resemblance to R. filifolia Gray, of the same complex in the genus but this last lacks the prominent long, villous stipe to its akene. Extreme specimens of R. curtissii Britt. ex Small and R. harperi Small may have some development of stipe and stipe hairs; however none of the above tend to have leaves as broad, stipes of akenes as long and as hairy. The difficulty remains now with the distinctness of the material identified as R. crinipes but with the sparse available evidence for it in that no material has been found outside the type collection.

Habitat and Management Implications

R. crinipes was collected from "dry places, roadsides (exsiccated), Mobile," and "ditches, borders of ponds, Mobile". One may infer from this, and from visiting the Mobile area, that the original habitat was pineland (slash and longleaf) savanna, probably sandy-peat soil of high hydroperiod. All

species of this complex of beakrush are found to be a part of grass-sedge bog communities whose abundance and perpetuation depend upon periodic burning to reduce forest and shrub competition together with a continuance of high levels of soil water.

References

- Gale, Shirley. 1944. Rhynchospora, section Eurhynchospora in Canada, the United States and the West Indies. Contribs. Gray Herb. CLI, pp. 89-278.

SPECIES Rhynchospora crinipes Gale. Alabama beaked-rush

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		x		x			x	
Damage								x
No Lasting Effect								
Beneficial if Done Properly	x				x	x		

Other Comments: Drainage of habitat would destroy this species!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Rhynchospora crinipes Gale



Rhynchospora culixa Gale [5]

Status: Endangered

Technical Description:

Tufted perennial sedge, mostly 5-8 dm tall from a shallow, diffuse root system, perennating by lateral offshoot buds.

Culms: erect, slender, wand-like but somewhat stiffish, the nodes close-set proximally, remote distally, the internodes subtrigonal, the angles comprised of rounded nerves, the level interfaces shallowly and narrowly ribbed, the surfaces smooth, pale green, pale yellow green or tannish at the slightly contracted nodes.

Leaves: somewhat crowded toward the base, the lowest ones chaffy, short-linear, scale-like, persistent, the largest up to half as long as the culm, erect or ascending, the sheathes continuous, tubular, less than 1/5 as long as blades, the rounded backs pale green, multiribbed, smooth, the ventral area scarious, tannish, at the orifice slightly darker, the thin margin truncate or slightly concave, the blades narrowly linear, mostly 2-3 mm wide tapering above midblade gradually to a slightly callused, broadly acute, scabrous apex, the margin scabro-ciliate, the surface pale green with only the mid-vein strongly raised.

Inflorescence: spikelets lance-ovoid or broadly ellipsoidal, narrowly acute, 1-2-flowered, ca. 4-5 mm long, a pale reddish-brown, few in cymules, the cymules few-to-several per complex on ascending or erect, unequal branches, with 1-3 complexes lateral to main axis on ascending slender peduncles, each peduncle subtended by a bracteal leaf similar to a foliage leaf but smaller and shorter, plus a terminal bracteate complex, these complexes confined to the upper 1/4 of the culm, the lower ones more distant; each cymule stalk subtended by a scale-like, linear-subulate bract and enveloped at base by a short-tubular, scarious prophyll.

Scales per spikelet few, tightly imbricated, the lowermost sterile, emarginate and strongly awned, the awns scabrid-margined, the fertile scales broadly ovate, ca. 3.0-3.5 mm long, strongly cupped, the apex bluntly acute, often mucronulate, the margins very thin, pale, the surface with only the midnerve evident.

Florets: perianth bristles usually 6, antrorsely barbellate, unequal, the longest reaching about to middle of ripe akene; stamens 3, the flattened filaments supporting narrowly oblong, erect, basifixed anthers; style slenderly linear, 2-branched at about the middle.

Fruit: akene in outline broadly elliptical or obovate, ca. 1.5-2.0 mm long from base to tubercle tip, at thickest point biconvex but not tumid (in cross-section narrowly elliptic), pale brown, irregularly wavy-transverse-rugulose, the intervals narrower than the ridges, these and the ridges finely vertically lined; tubercle depressed-conic, grayish-spongy, ca. 0.4-0.5 mm high, sometimes apiculate, the basal rim definitely buttressed (forming a low "cliff" rather than having an indentation or groove around its base!)

Special Identifying Features:

R. culixa, according to Gale (1944) is in the series Harveyae, which comprises only 4 species, all of which have the tubercle of the akene definitely buttressed. It is the lowest plant of the four, is the most slender, with the upper culm leaves much more reduced. While the other three species (R. megalocarpa, R. harveyi, R. grayii) have akenes that are finely to coarsely pitted with concave alveolae, this species in addition to being finely alveolate, has a low but very evident cross-ridging of its fruit surface.

Distribution and Flowering Season:

Pineland savanna and edges of flatwoods bogs, evidently very rare and local, Coastal Plain, southwestern Georgia and northwestern Florida; flowering and fruiting from late May into early July.

Habitat and Management Implication:

This rare sedge, which I have seen only once in the field, seems to take moister ground than others of its complex do. Actually R. megalocarpa is a coarse beakrush of deep dry sands of Longleaf Pine and Sand Pine sandhills or sandscrub, R. grayii is commonest in sandhills also with an affinity for the Longleaf pine-Turkey Oak formation, while the more ecologically ample R. harveyi is found in prairies, upland clearings and upper edges of boggy swales from the prairie provinces in the mid-West eastward through much of the Coastal Plain. R. culixa however appears to prefer a moist substrate such as in pine flatwoods savanna or along the edges of hillside seep bogs in Longleaf Pine hills. Locality data from the few existing collections show that it is part of a grass-sedge complex that would include many more species of Rhynchospora (R. divergens, R. pusilla, R. rariflora, R. globularis, R. torreyana, R. schoenoides, etc.), Fimbristylis puberula, Scleria, various Cyperus, many Dichanthelium Panicum, P. agrostoides, P. tenerum, Paspalum laeve, P. lentiferum, many Aristida, and a variety of Andropogon, Juncus, Xyris, Aletris, many bog orchids, Polygala, Rhexia, Sarracenia, Eriocaulon, Lachnocaulon, Lachnanthes, etc. The substrate is a black sandy peat of high hydroperiod. The commonest savanna trees are Longleaf Pine, Pond Cypress, Pond Pine, Nyssa biflora, Liquidambar, Red Maple. In the shrub layer are numerous heaths in genera Vaccinium, Lyonia, Leucothoe, Lyonia, also Myrica, Ilex glabra and coriacea, Rubus, Smilax. Saw Palmetto is locally common, together with large clones of Cyrilla. The grass-sedge openings were created by woods fires, and removal of fire as a factor promotes invasion of the clearings by trees and shrubs.

Such savanna and bog habitat in the Coastal Plain is rapidly being drained, this followed by clear cutting and mechanical site preparation for pine plantation or for conversion to improved pasture or row crop agriculture. In any event the result is total destruction of habitat for this rare sedge and many other rarities as well.

References:

Gale, Shirley. 1944. Rhynchospora, sect. Eurhynchospora, in Canada, the United States and the West Indies. Contr. Gray Herb. CLL.

SPECIES: Rhynchospora culixa Gale

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Do not drain!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Rhynchospora culixa S. Gale



245 CYPERACEAE

Rhynchospora globularis (Chapm.) Small
var. saxicola (Small) Kukenthal
Rhynchospora saxicola Small

Status: Threatened

Technical Description:

Perennial, slender Beak-rush from a shallow, diffuse-fibrous root.

Culms: usually stiffly erect, slender, mostly 2-4 dm high, in small tufts or densely caespitose, triangulate, smooth, sometimes with more than 3 sharp ridges and sulcate distally, usually with 2, short erect or ascending lateral branches toward tip.

Leaves: usually in 3 planes, more crowded, largest and longest toward base of culm, there mostly $1/3-1/2$ as long as the culms, with sheathes overlapping, less than $1/5$ the total leaf length, the backs rounded or slightly keeled, multiribbed, the margins narrow, scarious, this border widening distally to junction with blade, there forming a convergent pair of low, thin auricles, the blades narrowly linear, flat or somewhat folded, 1.5-3.0 mm wide, above the middle gradually tapering to an abruptly acute, harsh-margined apex, the margins at least distally scabrid, the backs with a few low ribs, the upper surface with only the midnerve evident; leaves upward on culm progressively shortening, with shorter sheathes, and more distant, grading into bracteal blades.

Inflorescence: spikelets ovoid, or ellipsoidal, mostly 1-3-flowered and fruited, ca. 3 mm long, acuminate, a rich glossy pale reddish-brown, in small clusters (cymes), usually 1 terminal and 2 lateral and distant in the upper $1/3$ of the culm, the slender lateral peduncles subtended by erect or curvate, closed-sheathed, narrowly linear bracteal leaves, all cymes either simple and made up of but 1 cymule or weakly compound with 2 or a few more cymules, the central often sessile, prophyllate, the others on stiff peduncles of varying lengths; individual cymules of 1-few spikelets, usually subtended by chaffy, linear bracts grading into spikelet scales; outer spikelet scales barren, often scabridulous-awned or cuspidate; fertile scales broadly ovate to suborbicular, thin, only the midnerve evident, apically obtuse, the margin entire, the backs strongly rounded.

Florets: perianth bristles slender, stiffish, antrorsely barbed, usually 6, mostly overtopping akene, often the tubercle; stamens 3, the filaments flat, erect, the linear anthers basifixed, erect, bilocular; style 2-branched from about the middle.

Fruit: akene broadly obovoid, tumid-lenticular (in cross section biconvex, not round), including tubercle 1.3-1.6 mm long, 1.1-1.3 mm wide, with several undulant and interrupted or anastomosing cross-ridges, the intervals between strongly etched by numerous sharp, fine vertical ridges to form a system of rows of parallel-sided rectangular alveoli, the surface a dark brown or chestnut brown, lustrous; tubercle (persistent style base) grayish, strongly depressed-conic or discoid, at most 0.3 mm high, not buttressed but invaginated around the rim, bearing at the depressed apex a small apiculus.

Distribution and Flowering Season:

Moist open areas on and around granite or grit outcrops, Piedmont and inner Coastal Plain, Georgia; flowering mostly in June but intermittently well into July.

Special Identifying Features:

This is seemingly but one of the radiate extremes from a large matrix species, R. globularis (Chapm.) Small, and perhaps best should be re-evaluated even at the varietal level. It tends to be distinguished from the rest of the Series Globulares Gale by a combination of such fruit characters as bristles overtopping ripe fruit, tubercle strongly depressed, conic-discoid, apiculate. However, a single population may vary widely even in these characters, and even a single plant may show fruit variation. Unfortunately there is sufficient overlap with other taxa such as R. oblitterata Gale, R. sulcata Gale, even R. culixa Gale of the neighboring series Harveyae to make one realize why Kunkenthal made these varieties, the first two of R. globularis, the latter one of R. grayii.

Habitat and Management Implication:

R. globularis saxicola grows on and around outcrops of granite in the Georgia Piedmont, on and around the Altamaha Grit formation in the Coastal Plain of Georgia. In the former situation it is in shallow, seasonally wet depressions or along intermittent streams or seeps on and around the granites, usually in full sun and on these shallow inwash soils is in association with various grasses and sedges such as Agrostis, Dichanthelium, Panicum, Andropogon, various carices, Fimbristylis, other Rhynchospora (particularly R. globularis, R. capitellata, R. glomerata), Puirena, Scleria, Scirpus. Other herbaceous associates include Juncus (particularly J. georgianus), Xyris, Allium, Schoenolirion croceum, Oenothera fruticosa, Rhexia mariana, R. virginica, Lindernia monticola, various composites, particularly Senecio tomentosus, etc. In the Altamaha Grit country the number and variety of grasses and sedges increases, but the character of the total herb assemblage is not much changed, except to add some of the endemics of the grit, particularly Penstemon dissectus, Bigelowia nuttallii, Marshallia ramosa and the shrubby Hypericum lloydii. The forest surrounding and invading the granites is mostly upland oak and pine, the oaks mostly Q. montana, Q. velutina, Q. nigra, Q. rubra, Q. coccinea, Q. marilandica and the otherwise rare Q. georgiana, the pines usually P. taeda, P. echinata, sometimes P. virginiana. Pignut Hickory is frequent as are White and Sand Hickory, Persimmon, Winged Elm, Sassafras, Black Gum, Black Cherry. The understory has an abundance of Cornus florida, Cercis, various Rhus, particularly R. copallina, Chionanthus, Vaccinium arboreum, with blackberry, Poison Oak, and lowbush blueberries abundant in the shrub layer. Smilax, Gelsemium, Anisostichus and Poison Ivy are common vines, together with masses of invading Lonicera. In the Grit country Longleaf Pine is the common pine, while Q. marilandica, Q. margareta, Q. stellata and Q. laevis become the common oaks. Aristida stricta and other 3-awns, a greater variety of Andropogon, Panicum and cyperaceous plants shows up, but the floristic affinity to granite glades is plain.

Threats to this beakrush are multiple. The granites are quarried, which destroys the sites. In park areas (such as Mount Arabia) hikers and sightseers trample the shallow pools and streambanks. Many outcrops contiguous to areas of high population such as Atlanta are being subdivided for residential lots. Other outcrops have become low grade pasture and the sedges suffer from trampling and grazing. In the grit areas the same problems exist, but also the shallow soil cover, if fairly level, is now often planted to Slash pine or other pine, this leading ultimately to a shading out of sun plants such as this one.

References:

- Gale, Shirley. 1944. Rhynchospora, sect. Eurhynchospora, in Canada, the United States and the West Indies. Contribs. Gray Herb CLI.
- Kukenthal, Georg. 1954. Vorarbeiten zu einer monographie der Rhynchosporideae. Botanische Jahrb. 75 Band. Heft 2: 156-168.

SPECIES: Rhynchospora globularis (Chapm.) Small var. saxicola (Small) Kukenth.

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy							X	
Damage		NA	NA	NA				X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: Do not drain!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Known Range of:

Rhynchospora globularis (Chapm.) Small
var. saxicola (Small) Kukenthal



245
CYPERACEAE

100
Rhynchospora punctata Ell. [1-4]

Status: Threatened

Technical Description:

Tufted perennial sedge, between 7 and 10 dm tall, perennating by lateral offshoots from a diffuse-fibrous-rooted stock.

Culms: erect or leaning, fairly rigid but wand-like, pale green, triangular, smooth, each edge a rounded nerve, the flattish or slightly concave intervals finely grooved and nerved, the nodes slightly contracted.

Leaves: a few widely spaced on mid and upper culm, mostly crowded toward the base, there largest save for some scale-like outer ones or fibrous remnants of dead ones, the sheaths ca. 1/5 the total leaf length, closed, the backs rounded below, sometimes strongly keeled distally, multiribbed, the ventral side scarious, at apex by junction with blade, thin, strongly concave, the blades 1.0-2.5 dm long, proximally and distally often keeled, otherwise flat, narrowly linear, 3-6 mm wide, narrowing gradually above mid-blade, then abruptly to a blunt-acute, scabrid apex, the margin narrow but thickened and white, minutely scabrid, the surface save for the midnerve pale green, finely ribbed.

Inflorescence: spikelets lance-ovoid, narrowly acute, ca. 5 mm long, a rich, glossy reddish-brown, 4-flowered, usually 2-fruited, usually few/cymule, the cymules loosely turbinate, few to several per complex on ascending to erect, unequal branches, about 3 decompound complexes lateral to main axis, and 1 terminal, on ascending or slightly spreading slender peduncles, each peduncle subtended by a bracteal leaf similar to foliage leaf but small, shorter, somewhat narrower, the lowest bracteal leaf much shorter than the peduncle, the uppermost one longer, each primary peduncle terminating in 2-3 green, linear, subulate involucre bracts subtending unequal secondary peduncles, each of these with a basal chaffy bract and enveloped by a chaffy, tubular prophyll; scales of spikelet fairly tightly imbricate, the lowest empty, smaller than the fertile, strongly cuspidate, the fertile scales broadly ovate, ca. 4.0-4.5 mm long, thin, the margins pale, the apex narrowly rounded, the backs rounded with only the mid-nerve evident, this departing subapically to form a short, minutely scabrid bristle; upper scales empty.

Florets: perianth bristles 6, antrorsely barbellate, extending at least to base of tubercle of ripe fruit and often to its tip; stamens 3, filaments flat, the short-linear anthers basifixed; style slenderly linear, cleft to about its middle.

Fruit: akene including tubercle ca. 2.5 mm long, obovoid or ellipsoidal, evidently dorsiventrally flattened (in plane parallel with plane of bracts), body transversely wavy-rugose with many, sometimes anastomosing, ridges, the intervals sharply and concavely alveolate, the alveolae rectangular and vertical, the surface reddish-brown, dullish; tubercle conic-triangular, ca. 0.4-0.5 mm long the sides straight, the base scarcely flanged, not buttressed, slightly decurrent on the upper akene edge, the apex either acute or acute-

apiculate.

Distribution and Flowering Season:

Wet acid pine flatwoods and savanna, southern Georgia and northern Florida; flowering and fruiting from late May into early July.

Special Identifying Features:

R. punctata is in the Series Globulares Gale, distinguished from other complexes by its rectangular-alveolate fruit surfaces which are also transversely rugose, as well as by the fairly rigid habit, the development of lateral and terminal decompound clusters of cymules, the presence of usually 6 perianth bristles and a conic, depressed conic, or short-subulate, grayish tubercle. Within the Globulares, the tall and firm culms, broadish and firm leaves, and particularly the very flattened and rugulose fruit, place R. punctata close to R. compressa Carey ex Chapm. In fact, the only way to tell the two apart is by fruit. The perianth bristles of R. punctata are longer, reaching at least to the tubercle base and often to its tip (rather than extending only to about the upper 1/3 of the akene as in R. compressa!), while the tubercle itself is straight-sided, apiculate (rather than concave-sided, acuminate as in R. compressa), its base scarcely flaring or flanged, and with sides slightly decurrent (rather than strongly flaring-flanged and not at all decurrent-sided as in R. compressa).

Habitat and Management Implication:

R. punctata is rare and local in the Longleaf Pine-Gallberry-Saw Palmetto flatwoods of southern Georgia and (according to old records) northern Florida. In the past it was doubtlessly maintained in grass-sedge clearings created by natural woods fires. Associate species include many lowland Andropogon, Panicum, Erianthus, Manisuris, Paspalum, Aristida, Carex, Fimbristylis (particularly F. puberula), Rhynchospora (among which are the similar R. compressa, R. globularis, which may account for this plant being overlooked!), Aletris, Eriocaulon, Lachnocaulon, Xyris (many species), Hypoxis, Lachnanthes, Lilium catesbaei, Tofieldia, Zygadenus, Sarracenia (particularly S. minor, S. flava), Rhexia, Ludwigia, lowland asclepiads, Lobelia, Polygala, and many composites. This showy community develops only on high hydroperic soils and in full sun.

Risks to this species in its few known localities include (1.) fire protection which allows woody vegetation to invade open areas, (2.) drainage ditching precursory to mechanical site preparation or logging of wet pinelands, which dries out the habitat as well as destroys the bog soils, or (3.) clearing for the purpose of development of improved pasture, in which case even without drainage the aggressive introduced Paspalum or Cynodon crowd out native grasses and forbs. Large tracts are also being drained, cleared, and prepared for row crops, and thus more habitat is lost.

References:

Gale, Shirley. 1944. Rhynchospora, sect. Eurhynchospora, in Canada, the United States and the West Indies. Contr. Gray Herb. CLL.

SPECIES: Rhynchospora punctata Ell.

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X			X	
Damage			X					X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: Drainage ditching destroys the habitat !

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Rhynchospora punctata Elliott



100
XYS
XYRIDACEAE:

Xyris drummondii Malm. ^[94] Drummond's yellow-eyed grass;
~~yellow-eyed grass~~

Technical Description

A low, very tufted, herbaceous plant, usually with the bases buried in peat or sand.

Leaves.--Broadly linear or lanceolate, 3-8 cm long, acute, mostly entire, the blades greenish but each with a shining dark brown "patch" at the base, and all arranged in a small fan (resembling leaf arrangement in Iris but tiny!)

Inflorescence.--Scapes slender (linear-filiform), but stiffly erect, 4-20 cm long, low-ribbed, the scape sheathes with leaf-like blades and about as long as most of the leaves. Spikes many-flowered, terminal and solitary on scapes, each resembling a small cone, lance-ovoid, mostly 8 mm. long or slightly less, sharp-tipped, somewhat laterally flattened. Bracts several, spirally arranged or in 2 ranks, the lowest sterile, sometimes with green narrow tips, the rest fertile, nearly round to obovate, keeled (appearing folded, the mid-rib along the angle) and each brownish with an elongated, narrowly elliptical or lanceolate dorsal area (a greenish area different in texture and along the mid-rib of the scale).

Flowers.--Lateral sepals 2, boat-shaped, chaffy, opposite, keeled, with the keel margin ciliate (there is a 3rd sepal, this a membrane that covers the flower in bud and falls off when the petals expand). Petals 3, clawed, yellow, the blades spreading in morning, obovate, about 3 mm long. Staminodes 3, flat and slender below, above branching and covered with a brush of slender, long, yellowish hairs. Stamens 3, attached toward base of petal blades.

Fruit.--Capsule clasped by the lateral sepals, thin-walled, splitting longitudinally. Seeds numerous, attached in 3 longitudinal zones on inside of capsule, ellipsoidal, about 0.3 mm long, finely ribbed.

Distribution and Management Implication

Moist to wet acid sands or sandy peats of bogs and seeps in the Coastal Plain from southeast Georgia westward through northwestern Florida and south Alabama to southern Mississippi and Louisiana. Flowering from July through September.

Special Identifying Features

This is in a complex of little species such as X. flabelliformis and X. brevifolia which superficially look much like it. However, those two species flower mostly in spring and early summer, while this one flowers in summer and fall. Also, this is the only one in the complex that has the distinctive, chestnut-brown patch at the leaf base and the definitely laterally flattened spike.

Habitats and Management Implications

X. drummondii is always a plant of bogs or boggy places where the soil moisture is high. It is always in full sun and should be found usually where seepage has created exposures of wet fine sand and peat, there in association with other bog species of Drosera, low Panicum, Eriocaulaceae (Pipeworts), Rhexia. Small pitcher plant bogs in slash longleaf and pond pine flats are ideal situations. In that such areas have histories of fire and in that fire tends to reduce overgrowth of shrub understory species of Ilex, Myrica etc. that would otherwise take the habitat, it is to be assumed that this is a part of the grass-sedge-forb complex that makes up fire disclimax. The species is often found in areas where clear-cutting of pine accompanied by considerable disturbance of soil has occurred in addition to (frequently) ground fire. However, in areas where clear-cutting or other logging or site preparation has occurred and also drainage, the species disappears. Obviously its major enemy is drainage, not logging of associated overstory or mechanical site preparation. However, while it will occur in plantations where the young trees are on elevated "strips", it will not persist after the crowns have closed.

Reference

Kral, R. 1966. Xyris of the continental United States and Canada, Sida 2 (3): 177-260.

SPECIES: #153 Xyris drummondii Malme. Yellow-eyed grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage								X
No Lasting Effect		?	X	?				
Beneficial if Done Properly	X				X	X		

Other Comments: Drainage the problem

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Xyris drummondii Malme



295
XYRIDACEAE;

Xyris isoetifolia Kral. Quillwort yellow-eyed grass;
Yellow-eyed grass

Technical Description

Similar to X. drummondii, but taller.

Leaves.--Densely tufted, very slender (filiform) to 15 cm long, the narrow blades pale green, the bases broader, brownish and chaffy.

Inflorescence.--The flowering stalks (scapes) are narrowly linear, to 30 cm. long, are stiffly erect, in cross section oval or round, and each has a bladed sheath shorter than the leaves (the sheath blade similar to the leaf blade). Each scape terminates in a single cone-like spike, this 4-7 mm long, ovoid or ellipsoidal, acute or blunt, of many tightly overlapping scaley, chaffy bracts, the lower 2-3 sterile (without flowers in axils), the rest fertile. Fertile bracts ovate or obovate, about 5-7 mm long, scale-like, the apices rounded, the margins entire, the backs rounded, brown or reddish brown with dull green dorsal areas.

Flowers.--The lateral sepals, hidden by subtending bracts are similar to X. drummondii, being boat-like, chaffy, the keels ciliate. Petals with blades projecting beyond the subtending bracts, unfolding and spreading in the morning, yellow, obovate, ca. 4 mm long. Stamens and staminodia as in the preceding.

Fruit.--Capsule similar to the preceding. Seeds somewhat larger, about 0.5 mm long, faintly ribbed.

Distribution and Flowering Season

Moist sands or sandy-peats of savanna bogs, flatwoods pond margins, shores of limesink ponds and lakes, northwest Florida (Bay and Gulf Counties). Flowering from July into September.

Special Identifying Features

X. isoetifolia strongly resembles in its tufted habit, leaves and spikes X. baldwiniana, a species widespread in the Coastal Plain from eastern N. C. south to Fla. and west into eastern Texas. It differs mostly in having ciliate keels on the lateral sepals and in having a beard of hairs on the staminodes (these are lacking in X. baldwiniana).

Habitats and Management Implication

X. isoetifolia appears to be restricted to the karst country of northwest Florida, either directly around the ponds and lakes formed by "sinks" or in the poorly drained flatwoods surrounding. In either case it is commonly in full sun and associated with grass-sedge bog species of herbs. It may locally abound where wash has produced expanses of wet peaty sand and has been observed in abundance where pine flatwoods have been logged so as to

create wet openings. It is another species of fire disclimax, probably increased through reduction through fire of competing woody plant species and the rough they create, but definitely reduced or eliminated where drainage is created.

Reference

Kral, R. 1966. Xyris of the Continental United States and Canada,
Sida 2(3): 177-260.

SPECIES: #154 Xyris isoetifolia Kral Yellow-eyed grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage								
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: Drainage the problem, also shade.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Xyris isoetifolia Kral



XYRIDACEAE

Xyris longisepala Kral Kral's yellow-eyed grass
Yellow-eyed grass

Technical Description

Similar to the preceding but taller, coarser, less tufted.
Leaves.--Linear, to 25 cm long, 2 mm broad, acute, mostly erect, smooth, the blades greenish, the sheathing bases usually with touches of pink or maroon.

Inflorescence.--Flowering stalks (scapes) mostly 4-8 cm. tall, slenderly linear and sometimes twisted, toward the tips somewhat flattened and strongly 1-edged. Scape sheathes shorter than the leaves, with shortish blades. Spikes ellipsoidal to oblong, 1.0-1.6 cm long, blunt, of many, loosely overlapping bracts. Fertile bracts broadly oblong, 4-6 mm long, the tips rounded, the margins entire, the backs rounded, tan with a pale greenish or reddish-brown dorsal area.

Flowers and Fruit.--Lateral sepals linear-curve, slightly longer than the subtending fertile bract and thus with tips projecting beyond (exserted); keel narrowly jagged (the edge irregularly slender toothed) or ciliate. The 3 blades of the corolla obovate, about 3.5 mm long, unfolding in afternoon, yellow. Stamens and stamens as in the preceding. Seeds 0.4-0.5 mm long, longitudinally low-ridged, amber.

Distribution and Flowering Season

Moist to wet sandy shores of limesink lakes and ponds, northwest Florida and southeastern Alabama. Flowering from July through September.

Special Identifying Features

X. longisepala is similar to X. smalliana a more widespread species of swamps in the Coastal Plain from N.J. south to south Florida and west to southern Mississippi. However, X. longisepala is a smaller plant of consistently different habitat, its spikes are smaller and more often oblong, its flowers have much shorter petals and the seeds are smaller, differently ribbed. Its flowers unfold mid-day, while those of X. smalliana unfold toward evening.

Habitats and Management Implication

This species is in little danger so long as the shorelines of the small lakes and ponds it frequents are not effected physically by the management of surrounding forest. The only competitive vegetation of a woody sort is Hypericum. This, together with a large set of wetlands herbs, appears quite well adapted to the fluctuating waters typical of these karst areas. X. longisepala and associated species are present in great abundance some seasons, are virtually absent others, all depending on the frequency and timing of receding or raising of lake

waters. Shore areas of some of the ponds have in some observed cases been mechanically disturbed so as to prepare for pine plantations. Where such is done these plants disappear as they do also when the smaller ponds are drained so as to increase area for pines and for pasture.

Reference

Krai, R. 1966. Xyris (Xyridaceae) of the Continental United States and Canada. *Sida* 2(3): 177-269.

SPECIES: #155 Xyris longisepala Kral. Yellow-eyed grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								
No Lasting Effect	NA							
Beneficial if Done Properly					NA	---		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Xyris longisepala Kral



845
XYRIDACEAE;

Xyris scabrifolia Harper [Harper's yellow-eyed grass;
yellow-eyed grass

Technical Description

The plants solitary or in small tufts.

Stems.--The plant bases fleshy, bulbous, usually tinted with pink or purple.

Leaves.--Larger leaves linear, to 40 cm long and 5-10 mm broad, twisted, the blades broadening abruptly at the sheathing bases, dull greenish, appearing glazed (examination under hand lens reveals surfaces that are covered by fine tubercles and are thus called papillose). Sheathes of scapes shorter than leaves, the bases chestnut, the tips green like the leaf blades.

Inflorescence.--Scapes linear, stiffish, to 60 cm tall, twisted but erect, toward the tips 2-4-ridged and the surfaces glazed with papillae as in the leaves. Spikes 10-20 mm long, obovoid or ellipsoidal, of many, spirally arranged and tightly overlapping bracts, the tips blunt or acute. Fertile bracts obovate, 6-8 mm long, rounded, nearly entire, the backs rounded, dark reddish-brown or tan depending on age, the dorsal areas from pale green to pale brown.

Flowers.--Lateral sepals hidden by the bracts, linear, the keel narrow, toward its base jagged with thin, irregular teeth and toward its tip fimbriate (drawn out into slender, hair-like, long projections). Petal blades emerging in the afternoon, yellow, nearly round, about 5 mm long. Stamens and staminodes and fruit as in the preceding.

Seeds.--Oblong to ellipsoidal, translucent brown, 0.6-1.0 mm long, finely ribbed.

Distribution and Flowering Season

Moist to wet sandy peats of acid sphagnum bogs or sandy seeps, Coastal Plain, Georgia south to northern Florida, thence west into southern Mississippi.

Special Identifying Features

This rare plant was first described from a small bog in Meriwether County Georgia, where it has not been seen again. It is very similar in appearance to X. platylepis, but differs from it in having the foliage covered by fine tuberculae (warts) or papillae, in having rounder petals, and in having much larger, longer seeds.

Habitat and Management Implication

X. scabrifolia is to be looked for in the small hillside seeps and pitcher plant bogs within the stated area. It is never found on soils that dry out, is generally found rooted in sphagnum peat, mingled with pitcher plants, sundews and other wetland herbs. Its area is probably increased through logging of surrounding wetlands

pinus, so long as this is not accompanied by wholesale drainage. Fire increases it by eliminating competition of woody understory vegetation and the stronger grasses (as is true of most other fire and swamp disclimax forbs). It may persist for a time where the bogs and high hydroperiod savanna it frequents undergoes preparation for (mostly) slash pine plantation. It will disappear if drainage ditches are cut. If such are not made and the pinus are strip planted, it will disappear as soon as the crowns close.

References

- Kral, R. 1966. *Xyris of the Continental United States and Canada*, Sida 263: 177-260
- Small, J. K. 1933. *Manual of the Southeastern Flora*, p. 254. Chapel Hill, N.C.

SPECIES: #156 Xyris scabrifolia Harper Yellow-eyed grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Xyris scabrifolia Harper



245
XYRIDACEAE

Xyris tennesseensis Kral [5]

Status: Endangered

Technical Description:

Perennial, smooth, Yellow-eyed-grass, the plant base soft, somewhat fleshy, often bulbous, usually encased in dark, scale-like outer leaves, the roots slender, shallow, fibrous.

Leaves: all basal, the outermost scale-like, the larger ones linear, 14-45 cm long, the blades linear-gladiate (narrowed at base and apex), 0.5-1.0 cm broad, flat or slightly twisted, bright green, the apex incurved, bluntly acute, somewhat thickened, the margins slightly thickened, entire; equitant base 1/3-1/8 the length of the blade, pink, red or purple, the margin pale, broad, scarious (very thin), the surfaces smooth or finely papillate.

Scapes: sheaths of scape shorter than the foliage leaves, reddish or brownish proximally and with short blades; scapes linear, straight, 30-70 cm long, usually flattened and 2-5-ribbed distally and with at least 2 ridges quite wide and tuberculate-scabrid, subterete and 2-several ribbed proximally.

Inflorescence: spikes solitary and terminal on scapes, broadly ovoid, 1.0-1.5 cm long, blunt, of several tightly and spirally imbricated bracts, all except the lowermost and uppermost producing a single flower in the axil; fertile bracts suborbicular, rounded, entire or slightly erose, tan save for greenish, ovate-triangular dorsal areas.

Flowers: slightly zygomorphic (calyx), bisexual; calyx 3-parted, the outer sepal membranous and enfolding the flower in bud, the inner 2 subequal, opposite, boat-shaped, included, curvate, the keels thin, narrow, the distal half lacerate, broader, reddish-brown; petals 3, distinct, long-clawed, the blades obovate, ca. 4.5 mm long, 3.0 mm broad, yellow, apically rounded, lacerate, untolding in morning; staminodes bi-brachiate, distinct, 3, the long hairs beaded; fertile anthers 3, arising just above the petal claw and erect, the anthers ca. 2 mm long, lance-linear, the sacs near parallel, their tips projecting apically 0.4 mm beyond the flat connective apex; ovary superior, 3-carpellate, compressed-ovoid, the many ovules marginal in the single locule, the style elongate-linear, tubular, branching at level of the anthers into 3, linear, spreading, tubular branches, the stigmatic tips horseshoe-shaped, minutely hairy.

Fruit: A thin walled capsule splitting open by 3 valves; seeds ellipsoidal, ca. 0.5-0.6 mm long, slightly to very farinose (mealy surfaced), with 18-20 fine, longitudinal lines, these sometimes irregular or joining, also interconnected by finer cross-lines.

Distribution and Flowering Season:

Wet peaty seep slopes or shallow peaty swales, streambanks, Highland Rim of Middle Tennessee (Lewis County) and Valley and Ridge of northwestern Georgia; flowering from August through September.

Special Identifying Features:

This narrow endemic is distinguished from most other North American species by a combination of bulbous, colored bases, tuberculate-scabrid scape ridges, lacerate lateral sepal keels, and dark, farinose coated seeds. This essentially tropical and subtropical genus has but few representatives in Tennessee and northern Georgia and only one of these, namely X. torta, superficially resembles it. However, X. torta, which is strongly bulbous - based and has very twisted, strongly ribbed leaves, has fertile bracts tipped by crisped reddish hairs (lacking in X. tennesseensis), ciliate lateral sepal keels (those of X. tennesseensis are lacerate), and clear, rather than farinose seeds. Of all southeastern Xyris, the var. floridana of X. difformis most resembles X. tennesseensis but this variety has foliage generally scabrid overall, its spikes are more acute, its fertile scales are darker colored, its leaves tend to be flatter and to spread fanlike.

Habitat and Management Implication:

So far as is now known this Xyris is a genuinely rare and definitely endangered species. In middle Tennessee it is found only in Lewis County, in the Swan Creek watershed, either in open very local bog slopes where water seeps over and out of an upper Paleozoic calcareous sand, or in small openings along shale - bedded streams. The dominant vegetation of the Tennessee seep areas is grass-sedge, with the sedges in late season being mostly Rhynchospora capitellata, Scirpus, Eleocharis, the grasses being Leersia, Panicum, Agrostis, Cinna, Andropogon. Juncus is common, with a constant associate species being J. brachycephalus (Engelm.) Buch., an essentially northern plant. Dominant late season dicots are Parnassia grandiflora (in Tennessee), Phlox glaberrima, Lysimachia, Rudbeckia fulgida umbrosa, Solidago patula, and various wetland Aster. The Georgia site I have visited is similar, but is a swale rather than a seep-slope, and lacks the Parnassia. The substrate is usually shallow, but is continuously saturated and highly peaty. Surrounding woody vegetation is, in Tennessee, upland hardwoods, mostly Oak, Hickory, White Ash, Elm, Hackberry, Maple (both Sugar and Red), with a scattering of Juniper, with an understory mostly of Dogwood, Viburnum, Redbud, Sourwood, Ostrya, Carpinus, Vaccinium arboreum, Rhamnus; Alnus serrulata, Salix nigra and S. caroliniana, Sambucus and Cephalanthus abound along the streambanks and lower seep slopes.

Contiguous upland and ravine slope hardwoods in Lewis county have sustained much logging and are undergoing intensive logging today. Damage to the Xyris may be sustained through the disturbance of the seep areas by heavy equipment used in the logging operation. If care were taken not to do this, the Xyris might be favored to increase into areas previously too shady for it. However, the small openings it now occupies give every impression of having been there for a long time, and were probably maintained largely because of the wetness and shallowness of the substrate which would make it unsuitable for growth or colonization by most arborescent species, as well as by occasional natural woods fires.

The known Georgia populations of X. tennesseensis are now destroyed. The Bartow County site, a seep slope, was demolished through construction of a portion of Interstate Highway 75; the Gordon County locality which was along a railroad right of way beside U.S. Highway 411, has been drained out of existence.

References:

Kral, R. 1966. Xyris (Xyridaceae) of the continental United States and Canada. Sida 2 (3): 177-260.

_____. 1978. A new species of Xyris (sect. Xyris) from Tennessee and northwestern Georgia. Rhodora 80 (823): 444-447.

Note--This rare species has been discovered by Dr. David Webb in Franklin County, northwestern Alabama, and by me in Pickens County to the south in Alabama during the period 1980-81, thus adding another state to the known range.

SPECIES: Xyris tennesseensis Kral

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		NA	NA	NA			NA	
Damage								
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Upslope clear-cutting or site preparation may result in excessive erosion, this choking out vegetation in ravine bases.

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Range of:
Xyris tennesseensis Kral



45
 ERIOCAULACEAE

Eriocaulon kornickianum Van Heurck & Muell. - Arg. ¹¹⁻¹² Small-headed pipewort

Technical Description

The plants are low, probably short-lived, perennial herbs forming small rosettes or tufts of rosettes.

Leaves: Pale green, smooth, thin, linear-attenuate, 1-5 cm long, the clasping bases pale, spongy.

Inflorescence: Scapes at maturity are very slender, 5-9 cm long, about 0.5 mm broad, twisted, three to four ridged, sleeved at base by sheaths about as long as leaves and which have loose, paper, bifid summits. Inflorescence is subglobose or short oblong involucre head of chaffy bracts and unisexual florets, 3-4 mm broad and gray or gray-green save for pale "rims" of the white-ciliate perianth parts and bracts and the pale, thin, outer bracts. Bracts forming the involucre are broadly oblong to suborbicular, reflexed at maturity, 1.0-1.3 mm long, smooth, translucent, apex rounded. Bracts of receptacle are oblong or wedge-shaped, about 1.5 mm long, gray or gray-green, acute or obtuse angled, concave, keeled marginally with a scattered fringe of club-shaped pale hairs.

Flowers: The male flower has sepals linear curvate, concave, ca. 1 mm long, grayish-translucent, usually with a few, white, club-shaped hairs on the backs apically. Corolla members are two, subequal, yellowish, fused below to a club-shaped androphore (supports stamens), each corolla lobe has a black gland and a terminal tuft of club-shaped, white hairs. The female has two linear-curve sepals, about 1 mm long, gray translucent, tipped with short, white hairs or smooth; petals are two spatulate, curvate, blades broadly rhombic and opaque, bases clawed, the whole petal yellowish-white and trichome-tipped.

Fruit: Seeds are broadly ovoid, about 0.5 mm long, deep reddish brown, finely papillate or rugose.

Distribution and Flowering Season

Upland seeps, bogs, from Interior Highlands (Magazine Mountain, Arkansas), discontinuously south and west into Oklahoma and Texas. Flowering July, August.

Special Identifying Features

Eriocaulaceous plants are distinctive, but difficult to identify to species because most of the taxonomy involves characteristics of the tiny florets, bracts and seeds. This species looks most like E. ravenelii of the eastern Coastal Plain, but is smaller, has more trichomes on its bract and perianth margins, and has a distinctively different seed coat. The ranges of the two in no way overlap.

Habitat and Management Implication

E. kornickianum is known but from a few widely scattered localities and is very scarce even in the collections of larger museums. Invariably it is in permanently moist to wet, boggy sites, usually upland seeps, and in full sun. These seeps have a sandy base, are typically along small streams (sometimes intermittent) that drain areas of oak-pine forest or oak-hickory uplands. They are in a delicate balance with grasses, sedges, *Rhexias*, *Ludwigias* and rushes, being found in areas where organic sands form small openings of "wash", or in areas of thin, moist soil over sandrock. Site preparation involving any drainage would eliminate these plants. The localities I observed (atop Magazine Mt.) is so small that a single errant bulldozer could eliminate the entire population. Thus, if some trees were carefully removed so as not to disturb the soil, this species might increase by the opening up of some additional sunlit area; extreme care would be necessary. This is truly one of the rarities of the South.

Suggested Reading

Kral, R. 1966. *Eriocaulaceae* of continental North America north of Mexico. *Sida* 2(4):285-332.

Moldenke, H. N. 1937. *Eriocaulaceae*. *N. Amer. Fl.* 19(1).

Small, J. K. 1933. *Manual of the southeastern Flora*, pp. 257-258.

Note--A few additional localities have been added since this paper first appeared, the most significant being the discovery of E. kornickianum in the Piedmont of Georgia (see revised map). Here it appears in grass-sedge seep sites on and around granite outcrops, in essentially the same ecological situations as described above.

SPECIES: #31 Eriocaulon kornickianum Van Heurch & Mue11. - Arg.; Small-headed pipe-
wort

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy	(NA)	X	X	X			X	
Damage								
No lasting effect								
Beneficial if done properly					X	X		

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Prescription burns on a typical site would be difficult if not impossible. Therefore, this management practice for the most part does not apply to this species.

Revised March 1980

Eriocaulon kornickianum Van Heurck & Muell.-Arg.



245 ERIOCAULACEAE:)

→ Lachnocaulon beyrichianum Sporleder ex Korn. [E-1]
 bog-buttons; hairy-Pipewort or bog-buttons

Technical Description

Perennial herb, forming large shallowly domeshaped clumps of rosettes which cover a multibranched system of chaffy short stems.

Leaves.--Narrowly linear-attenuate, to 4 cm. long, grayish green, hairy, with sheathing bases.

Inflorescence.--Scape sheathes slender but loose, about as long as leaf blades, hairy with long crinkled hairs. Scapes 15-24 cm. long, slender, twisted, obscurely ridged, hairy with long translucent hairs, thus appearing grayish. Mature heads globose or short-oblong, pale-gray, 3.5-5.0 mm. broad. Outer involucre bracts ovate, about 1 mm. long, brownish, smooth or fringed with small clubshaped pale hairs on the backs and apically. Bracts of receptacle surface fiddleshaped, 1.5-2.0 mm. long, obtuse, brownish, basally smooth, hairy on the backs towards the tips with short, whitened, clubshaped hairs.

Flowers.--Male flower with 3 linear-spatulate sepals 1.5-2.0 mm. long, obtuse, brownish, hairy with white clubshaped hairs on the backs towards and at tips; androphore (stalk supporting stamens) smooth, clubshaped, about as long as sepals; anthers yellowish, slightly exerted. Female flower: sepals linear or linear-spatulate, about as long as but broader than male sepals, obtuse, tan or pale brown, backs and margins pilose, hairs toward apex white and club shaped; gynophore (stalk supporting ovary) short, densely hairy at base; carpels 3. ovary 3-locular, 3-ovulate, styles 3, branched.

Fruit.--Seeds ellipsoidal, somewhat flattened, reddish-brown, about 0.5 mm. long, very lustrous.

Distribution and Flowering Season

Sands, sandy peats and peat of pine flatwoods, savannas, and rather dry oak-pine barrens, southeastern North Carolina southward into central Florida. Flowering from May to frost, given proper weather conditions.

Special Identifying Features

These and related genera are often called "bog batchelor-buttons" or "hatpins" because of the slender scapes arising from rosettes and terminating in button-like heads of chaffy bracts and florets. The Lachnocaulons differ from Ericaulons mainly in their more slender rootsystems of non-partitioned roots, their comparatively hairy foliage and scapes, their perianths which are usually 3-parted rather than 2-parted, and their tendency to be found often in drier sites than most Ericaulon, mainly have 2 carpels and a 2-branched style whilst Lachnocaulons mainly have 3 carpels and 3 style branches.

Habitats and Management Implication

Lachnocaulon beyrichianum looks most like L. anceps, a wide ranging Coastal Plain species with larger, paler heads, larger perianth parts, broader leaves, and less lustrous seed. The two are often found in the same area, but L. beyrichianum in these cases is on higher, drier sites. Typical habitat for it is in dryish acidic white sands or sandy peats of clearings in longleaf or slash pinelands. It may appear in mature open stands of pine, but is shaded out of heavily stocked younger stands. Of the Eriocaulaceae plants it is least effected by drainage. Common associated herb and shrub genera are Andropogon, Aristida, Xyris (X. carolinensis), Polygala (those of drier sands), Rhexia, Heterotheca (mostly Graminifolia types), Panicum (Dichanthelium), Bulbostylis, Serenoa, Ilex (gallberry), Myrica, Lyonia. It probably maintains in nature through periodic burnings which would remove some grass-sedge competition and create forest openings. Site preparation methods, so long as they do not involve total drainage, probably favor this species so long as there are contiguous seed sources. However, it is shaded out later as the crowns of seeded or planted pines close.

References

- Kral, R. 1966. Eriocaulaceae of continental North America north of Mexico. *Sida* 2 (4): 285-332.
- Moldenke, H.N. 1937. Eriocaulaceae in N. Amer. Fla. 19 (1).
- Small, J.K. 1933. Flora of the southeastern United States, pp. 255-256. Chapel Hill, N.C.

SPECIES: #30 Lachnocaulon beyrichianum Sporleder ex Kom. Hairy-Pipewort

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Lachnocaulon beyrichianum Sporl. ex Korn.



245 JUNCACEAE;

Juncus caesariensis Cov. ¹⁻² New Jersey rush

Technical Description

Perennial scabrid rush, the culms solitary or tufted from a knotty rootstock, perennating from basal lateral offshoots.

Culms.--Erect or ascending, stiffish, terete, mostly 6-10 dm tall, multiribbed, the surfaces roughened by papillae and tubercles, thus dull pale green.

Leaves.--Alternate, the lowermost mostly broad, short scales, often persisting as fibrils, the foliage leaves scattered up the stem and gradually reduced in length, the larger ones lowest with sheathes cylindrical, to 10 cm long, slit from apex to near base on ventral side, there broadly scarious-margined distally and producing a pair of scarious, triangular, erect auricles ca. 3 mm high, the multi-ribbed, rounded backs scabrid as in the culms; leaf blades terete, narrowly lineal-cylindric, narrowly pointed, nodose-septate, 1-3 dm long, tuberculate-scabrid.

Inflorescence.--A compound of cymules, these on primary peduncles of various length that ascend from the upper nodes, the ultimate branches erect or spreading, the cymules head-like, hemispheric, few-to-many-flowered.

Flowers.--In small, simple or compound clusters 1.0-1.5 cm broad, subtended by chartaceous, smooth, triangular, acute to acuminate bractlets ca. 3-4 mm long; perianth tepaloid (all similar), the 6 segments narrowly triangular-subulate, 4-5 mm long, the inner cycle (petals) somewhat longer, rigid, greenish or with tints of pale brown, narrowly acute; stamens 6, shorter than the perianth, erect, the anthers basifixed; ovary superior, 3-carpellate, lance-ovoid, the body trigonous, the styles exserted, 3-branched.

Fruit.--Capsule ca. 5.0-5.5 mm long, somewhat exserted beyond the persistent perianth, lance-ovoid, the apex subulate, the surface a glossy red-brown; seeds numerous, a lustrous pale brown, narrowly fusiform, strongly bicaudate, ca. 2-3 mm long.

Distribution and Flowering Season

Sphagnum seep areas in swamps, boggy areas in flatwoods, ravines, Coastal Plain, southern New Jersey, eastern Maryland, eastern Virginia; flowering in July and August.

Special Identifying Features

J. caesariensis is most similar to J. canadensis, differing from it in having 6, rather than 3, stamens, but particularly in its conspicuously papillate-tuberculate foliage, this last feature an exclusive one for southeastern area Juncus of the complex

Habitat and Management Implications

This distinctive rush is always rooted in moist to wet, highly organic, acidic, usually sphagnum, substrate. Usually it is in sphagnum seeps in boggy flats in hardwood swamps or pine barrens, also seep slopes in ravines, thus its associates are primarily grasses and sedges, admixed with other rushes, *Xyris*, many *Rhexia*, *Lobelia*, *Aster*, *Solidago*, *Eupatorium* (particularly *E. dubium*, *E. maculatum*), *Vernonia*, etc. The Virginia localities are seeps around rises in hardwood swamps or seep slopes in ravines. The swamps have cypress in the wettest areas, some loblolly pine on low rises, overall with many lowland oaks, including *Quercus lyrata*, *Q. michauxii*, *Q. phellos*, *Q. nigra*, *Q. shumardii*, *Q. hemisphaerica*, etc., *Magnolia virginiana*, *Ulmus*, *Populus heterophylla*, *Acer rubrum*, *Fraxinus pennsylvanica*, etc. The rush may be along sphagnum rivulets in the shade, but is usually most abundant in small clearings. These same small streams may drain into deep swamp, where *Fraxinus caroliniana*, *E. tomentosa*, *Salix*, *Populus*, *Nyssa* are abundant, but the *Juncus* there is replaced by other species, particularly *J. effusus*, many robust *Carex*, *Scirpus*, *Saururus*, *Typha*, etc. In the hillside seep areas the uplands are primarily oak-hickory-pine with an ericaceous understory, breaking down slope into mixed hardwoods (with much beech and maple) having a plentitude of *Magnolia virginiana*, and an understory of *Vaccinium*, *Gaylussacia*, *Lyonia*, *Leucothoe*, deciduous *Rhododendron*, *Clethra alnifolia*, *Myrica*, *Alnus*. *J. caesariensis* is found where breaks in the overstory and thin spots in the understory allow enough sun to reach the seeps. Again, herbaceous associates are mostly grasses and sedges.

I have not seen *Juncus caesariensis* except in Virginia, the only state in the southeastern area it is known from. It may persist more abundantly in New Jersey, the state for which it is named, but the very specialized habitat makes this doubtful. In Maryland the one known area is presumed destroyed. In Virginia it is definitely rare with but three stations presently noted. Two of these are now being impacted adversely by a combination of such activities as residential lot construction, road building, chemical spraying of rights of way. Selective cutting of swamp species or of ravine slope species would probably not have an adverse effect providing mechanical disturbance of the wet substrate was not extreme.

References

- Coville, F. V. 1894. *Juncus caesariensis* Cov. (*J. asper* Engelm. non Sauze & Maillard) in Mem. Torr. Bot. Club 5: 106.
- Fernald, M. L. 1950. Gray's manual of botany, ed. 8, pp. 397-416. Boston, Mass.

SPECIES Juncus caesariensis Cov. New Jersey rush

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage						X		X
No Lasting Effect	X				X			
Beneficial if Done Properly								

Other Comments: site drainage would eliminate this species!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Juncus caesariensis Cov.



245 JUNCACEAE;

Juncus georgianus Coville [14] Georgia rush

Technical Description

Densely tufted, diffuse-and-fibrous-rooted, smooth, perennial rush.
Culms.--Erect or ascending, slender but stiffish, terete, strongly ribbed and grooved, pale green, mostly 2-4 dm tall, the bases often hidden by remnants of tufts of old leaves.

Leaves.--Crowded toward culm base, the outermost and lowest scale-like, the longest with overlapping sheaths from longer than to much shorter than the erect or spreading blades, their backs rounded, prominently ribbed, pale green, their involuted margins broad, white, subscarios, distally low-auricled; larger leaf blades 1/4-2/3 as long as the culms, narrowly linear, pale green, proximally flat, ca. 1 mm wide, the backs strongly ribbed, the upper surface shallowly concave, the margin a narrow, cartilaginous border, the tip narrowly tapering, half-terete.

Inflorescence.--Often 1/3-1/2 the total plant length, a cymose compound of secund racemes, the few primary branches of various lengths, usually dichotomously branched, the erect florets nearly sessile or on short pedicels, rather distant on the ultimate branches, the whole inflorescence longer than, and subtended by, 1-2 leaf-like, short-sheathed bracts, these bearing also in their axils narrowly triangular, scale-like, scarious-margined prophylls.

Flowers.--Individual flowers prophyllate, the lowest one subtending the pedicel, and (usually) two more directly under the perianth, scarious, broadly triangular, ca. 2 mm long, acute to rounded, sometimes apiculate or mucronate; perianth tepaloid, chaffy, the 6 segments erect, lance-subulate, ca. 4-6 mm long, broadly pale-scarious-margined, medially green with a narrow border of yellow or maroon; stamens 6, hypogynous, erect, the lineal, pale yellow, basifixed anthers much longer than the filaments; ovary superior, ovoid, ca. 3 mm long, green, smooth, the style reddish, ca. 1.0-1.5 mm long, the stigmas 3, linear, reddish, papillose.

Fruit.--Capsule oblong-ovoid, loculicidal, obscurely trigonous, ca. 3 mm long, lustrous, pale olivaceous, the numerous seed asymmetrically oblong, excentrically short-bicaudate, ca. 0.5 mm long, pale reddish-brown, irregularly longitudinally fine-ridged.

Distribution and Flowering Season

Moist sunny depressions on and around granite outcrops, Piedmont, from North Carolina south and southwest through South Carolina and Georgia into eastern Alabama. Flowering mostly from late May into late July.

Special Identifying Features

Of the e-septate-leaved, prophyllate Juncus in the southeastern area, J. georgianus is distinguished by its flat (in contrast to terete or strongly involuted) leaf blades, its shortish involucral bracts, its long (4-6 mm) flowers with the perianth segments very erect even in fruit.

Habitat and Management Implications

J. georgianus is locally abundant on granite outcrop areas, usually the tufts rooted in the shallow in-wash of edges of shallow pools. Herbaceous associates are such plants as Isoetes, Rhynchospora globularis (vars.), R. capitellata, Bulbostylis, Fimbristylis, Agrostis elliottiana, Cyperus granitophilus, Eleocharis tenuis, E. obtusa, Panicum flexile, P. lithophilum, various other Panicum, Diamorpha, Sedum, Arenaria species, Talinum, Gratiola, Lindernia monticola, L. anagallidea, Rhexia mariana, R. virginica, Utricularia cornuta, Vicquiera, Oenothera fruticosa, Schoenolirion croceum, Senecio tomentosus, etc. The substrate is a highly organic sand, with the granitic substrate not far below, and the abundance of the herbaceous plants around the temporary pools is largely dependent on quantity of winter and early spring rainfall in that the summers are usually droughty. Slowly invading the granite are the surrounding, usually poor quality, stands of oaks such as Quercus georgianus, Q. stellata, Q. falcata, Q. nigra, Q. hemisphaerica, Q. montana, Q. rubra, Q. velutina, Q. marilandica, etc., Juniperus, Pinus virginiana, P. echinata, P. taeda, Diospyros, Ulmus alata, Prunus, Sassafras. As these invade, the herbaceous cover so characteristic of open granite glades disappears. This rush, together with its often rare and local associates, is endangered mostly by quarrying of the granite outcrops and to a lesser degree by development of some of these areas for residential lots or for public recreation. Increasing numbers of people are drawn to the larger outcrops, this often involving much needless trampling of granite pool vegetation or destructive driving over it by various recreational vehicles.

References

- Radford, A. E., C. R. Bell & H. E. Ahles. 1968. Manual of the vascular flora of the Carolinas, pp. 273-280. Chapel Hill, N.C.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 281-286. Chapel Hill, N.C.

SPECIES Juncus georgianus Coville. Georgia rush

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			NA	
Damage								
No Lasting Effect	X							X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Juncus georgianus Coville



345 JUNCACEAE

Juncus gymnocarpus Coville ¹⁻⁸¹ Coville's rush, rush
J. smithii Engelm. not Kunth.

Technical Description

Perennial herb.

Culms.--To nearly 1 meter tall, green, roundish in cross section, smooth, arising like close-set posts in a picket fence from a shallow, stout, creeping, reddish-brown, scaly rhizome.

Leaves.--All toward base of culm, the lowermost scale-like, reddish or purplish-brown, the uppermost more tubular, upwardly greenish, acute.

Inflorescence.--Sessile or nearly so, the flowers usually several in a diffuse system of cymes (often broader than high), appearing to arise laterally from the gradually tapering culm tip, the branches or clusters of branches arising from small clusters of scaly, green-midribbed, lance-ovate prophylls.

Flowers.--Symmetrical with short prophylls immediately below, these mostly ovate, acute, with broad green midribs. Perianth spreading, the sepals and petals each 3, greenish-brown, 2.0-2.7 mm long, much shorter than the mature fruit, the sepals lanceolate, acuminate, longer than the ovate, round-tipped, broadly thin margined petals. Stamens 6, anthers as long as filaments; ovary superior.

Fruit.--Capsule when ripe with firm pale greenish-brown valves, ovoid, about 3 mm long, the valve edges sharply raised, beaked. Seeds ca. 1 mm long, unequally oblong, with short tails on both ends, many-ribbed.

Distribution and Flowering Season

Swamp woods, mountains of eastern Pennsylvania to the mountains of North Carolina and Tennessee with disjunctions in Coastal Plain, namely northwest Florida, southeastern Alabama, Southern Mississippi. In North, flowering in August; in South, flowering in May, June.

Special Identifying Features

This species, which is being found rather frequently in sphagnum mountain swamp woods is much more rare in the Gulf Coastal Plain. It is most similar to Juncus effusus and J. coriaceus, differing from the former in its longer rhizomes, its perianth (in J. effusus this is as long as or longer than the ripe capsule), and its thicker-walled capsules which narrow toward the tips rather than being blunt. It differs from the latter again in its rhizomatous (rather than clumped) habit, its smaller ovoid (rather than larger and round) capsules, its more delicate inflorescence with usually more flowers.

Habitats and Management Implication

Many Juncus are found in open swamps or marshes. This one is usually in the shade, its rhizomes in peat-muck or sandy peat muck, in the shade of bottomland hardwoods (or cypress-tupelo-swamp, willow oaks in the Gulf South). Often it is near or in mats of Sphagnum, not actually in the deepest swamp but rather the shallower margins.

Cutting of the swamp forests in which this grows may alter the habitat sufficiently to raise the water enough to obliterate this species. Opening up of the swamp

forest tends to admit other plants of more sunny situations which will crowd out the species. Careful selective logging of the overstory should effect it little.

References

Coville, F. V. 1894. Mem. Torr. Bot. Club 5: 106.

Engelmann, George. 1868. A revision of the North American species of the genus Juncus. Trans. Acad. Sci. St. Louis 2: 424-498

Small, J. K. 1933. Manual of the southeastern flora, pp. 281-286. Chapel Hill, N.C.

SPECIES: #87 Juncus gymnocarpus Coville, rushes

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X		X		
Damage								
No Lasting Effect	NA				X			X
Beneficial if Done Properly							NA	

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Juncus gymnocarpus Coville



245
LILIACEAE,

→ Harperocallis flava McDaniel, yellow-petaled Harper's beauty
[2-3].

Technical Description

Smoothish perennial, increasing by shallow, slender, swollen-noded rhizomes.

Stems: The short stems usually sheathed at base by fibrous old leaf bases.

Leaves: Close-set at plant base, equitant and distichous (as in Iris) slightly spreading, linear, mostly 5-20 cm. long, mostly 2-3 mm. wide, the sheathing bases thin, straw-colored to near white, the blades flat or slightly twisted, prominently ribbed, pale green, firm, acute, entire.

Inflorescence: Scape slender, elongate, to 5.5 dm. high, pale yellow-green, with 3-5 distant, small, chaffy, erect clasping entire bracts. Flower solitary at scape tip, usually with 3 broadly triangular chaffy bracts to 3 mm. long, these persisting as a cup.

Flowers: Tepals (calyx and corolla appearing alike) 6, persisting as in rushes, spreading in anthesis, erect in fruit, oblanceolate, acute, 9-15 mm. long, yellowish above, greenish beneath, with several lengthwise nerves. Stamens 6, arising around base of ovary, ascending-erect, the filaments slender, tapering apically, 6-7 mm. long, the anthers oblong, attached at base, 2-3 mm. long, with a short, peglike apex. Ovary ovoid, 3-lobed, 7.0-8.5 mm. long, minutely and copiously bumpy, the lobes each narrowing into separate, buttonlike stigmas.

Fruit: Capsule surrounded by erect, now greenish, purple-margined tepals, ellipsoidal, 8-9 mm. long, 3-chambered, the surface minutely warty. Seeds narrowly fusiform, pale, yellow, 2-3 mm. long, straight or curved and often twisted.

The above description is based in part on duplicates collected by Dr. McDaniel and upon his original description (1968).

Distribution and Flowering Season

Pine flatwoods savanna bogs, in Franklin County, northwestern Florida; flowering in May.

Special Identifying Features

Harperocallis has but 1 species, this discovered by Dr. Sidney McDaniel in 1965. It is in that section of the Liliaceae occupied by genera such as Tofieldia, Pleea, Narthecium, etc. and grows with species of the first two genera. So far it has been found only in the original localities.

Habitats and Management Implication

The habitat appears to be along the transition between Cyrilla-Cliftonia and in open pineland bog, involves bog soils high in sand and peat, and is occasionally burned. In the more open, boggy sites it is found with Sarracenia, Xyris, Eriocaulon, Pleea and a wide variety of grasses and sedges. In the Titi, it is found around bases of Cliftonia, Myrica. The pines of the area are Pinus palustris, P. elliotii, P. serotina. Maintenance of this species is dependent primarily on: (a) continuance of some openings in the Titi-pineland bog transition; (b) absolutely no drainage ditches; (c) occasional ground fires hot enough to reduce competing grass-sedge and woody vegetation.

Since its discovery, this species is getting scarcer, primarily because there has been no fire in the area.

References

- McDaniel, Sidney. 1968. Harperocallis, a new genus of the Liliaceae from Florida. Journ. Arn. Arboretum 49: 35-40.

Revised March 1980

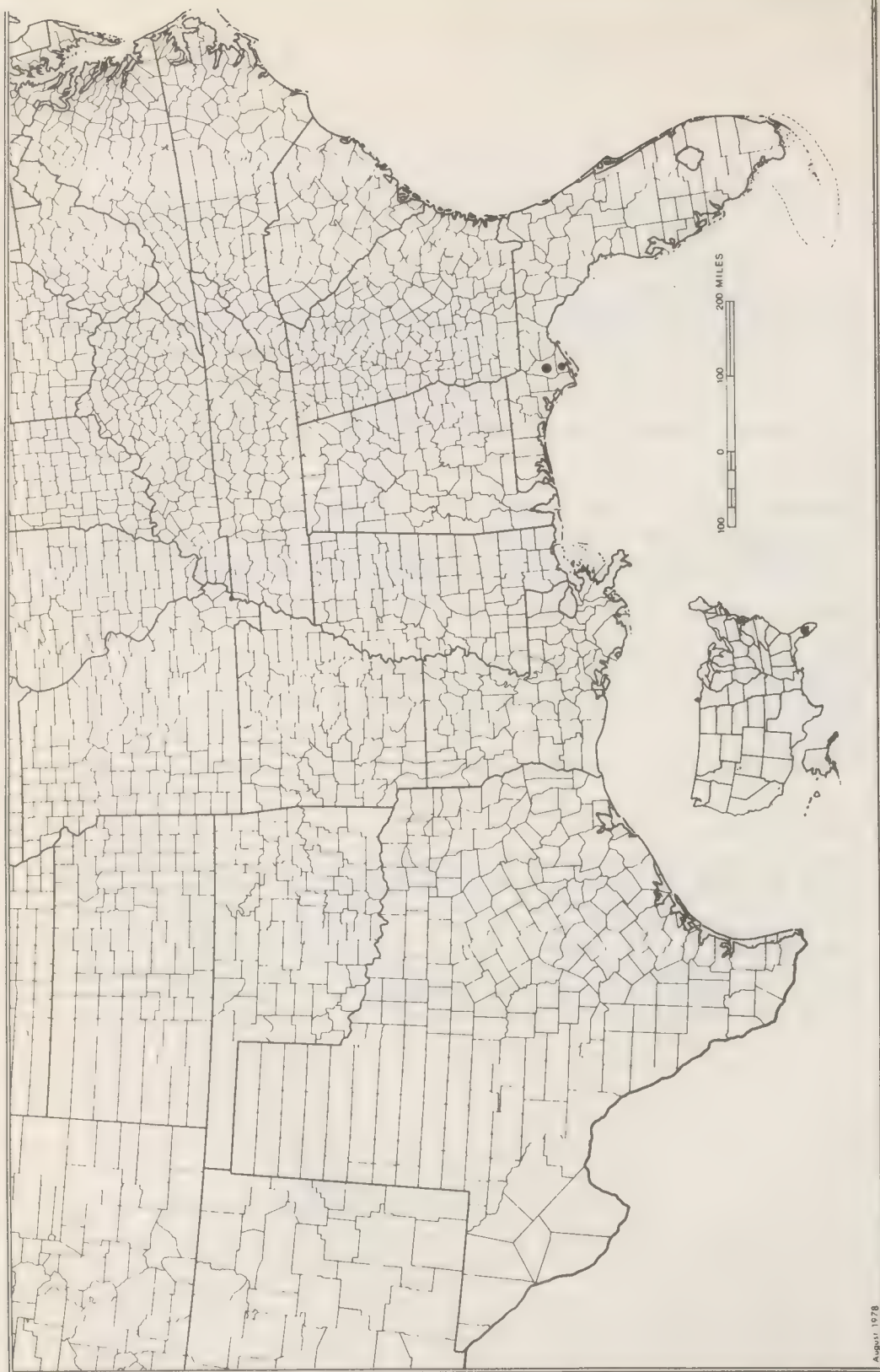
SPECIES: #134 Harperocallis flava McDaniel; yellow-petaled Harper's beauty

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

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MAP 134. HARPEROCALLIS FLAVA

245 LILIACEAE

Lilium grayii S. Wats. [Gray's lily; Roan lily or Orange-bell lily]

Technical Description

Perennial herbs rooting both from the stem and from deep-set subglobose, scaly bulbs, these putting forth stoloniferous offshoots that terminate in new bulbs.

Stems.--Solitary, erect to as much as 1.5 meters, usually lower, terete, pale green basally, upwardly often deeper green tinted with maroon.

Leaves.--Alternate toward stem base, toward stem middle in whorls of 4-6 on fairly distant nodes, spreading, lance-linear, elliptic-linear to lanceolate or elliptic, mostly 5-10 cm long, acuminate, the margins finely scabrid with bluntish tubercles, the bases narrowly acute or attenuate to a short petiole or sessile, the upper surface dark green, the lower surface paler with the several raised and parallel nerves often minutely scabrid. Stem leaves gradually reduced to alternate bracteal leaves, these frequently crowded on larger specimens, under or on flower stalks longer than the flowers.

Inflorescence.--Flowers 1-9, symmetrical, somewhat nodding or spreading on ascending stalks, at anthesis campanulate.

Flowers.--Tepals mostly 4-5 cm long, oblanceolate, mucronate, entire, the bases cuneate, all blades spreading but slightly toward their tips, the outer surfaces a fine orange-red, with deeper (almost cinnamon) red mid-nerves, paler and with greenish tints basally, the inner surfaces orange-red toward the tips, yellow medially and toward the base, liberally freckled with cinnamon-red splotches. Stamens 6, projecting forward, shorter than the tepals, the filaments slender, yellowish, broadening slightly toward the base, the anthers cinnamon-red, versatile, short-oblong, about 5 mm long.

Fruit.--Capsule (not seen by this writer) oblong, 3-4 cm long, erect.

Distribution and Flowering Season

Acidic clearings in shrub thickets, open woods, heath and grass balds, higher elevations in the Blue Ridge, along the Tennessee-North Carolina border and northward into southwest Virginia. Flowering late June, July.

Special Identifying Features

This species is closest to L. canadense, another bulb and stem rooter of acidic soils within the area, but has much smaller flowers, (the tepals of which are broader) shorter leaves (which have the lowest length-width ratio of southern Liliums), and a lower stature. The white bulb scale character mentioned by J. K. Small does not hold in that these may be found in both L. canadense and L. superbum.

Habitats and Management Implication

Lilium grayii has its bulbs deepset in moist, highly organic and siliceous black loams such as develop in grass-sedge meadows and clearings toward the mountain summits. Very often it is found in clearings amidst Rhododendron

Catawbiense, other heaths, alder, willow, shadbush, etc. or along the edges of red spruce-Fraser fir but never beneath them. Since most of its present habitat is within the boundaries of National parks, National forest or State parks, and since the plant has long been known to be rare and is protected, it may have some chance. The main threat to it today is not so much through habitat damage as through the gathering of the bulbs by professional or amateur gardeners or through vandalism.

References

- Small, J. K. 1933. Manual of the southeastern flora, pp. 290-291. Chapel Hill, N.C.
- Watson, Sereno. 1879. Revision of North American Liliaceae. Proc. Am. Acad. Arts and Sci. 14:213-303.

SPECIES: #136 Lilium grayii S. Wats; Roan lily or Orange-bell lily

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	X
Damage						X		
No Lasting Effect	NA							
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Lilium grayii S. Wats.



245
LILIACEAE

Lilium iridollae M. G. Henry, panhandle lily

L-51

Technical Description

Perennial, from deep-set pale, fleshy-scaled roundish or ovoid bulbs up to 4 cm broad, these producing spreading, pale, stiffish scaly elongate rhizomes which, in turn, develop bulbs terminally.

Stems.--Up to 2 m tall, smooth, terete, erect, toward base 0.7-1.0 cm wide, greenish with tints of brown or maroon, tapering upward into the inflorescence, there green or with reddish tints.

Leaves.--Elliptic-linear to elliptic, oblanceolate or narrowly obovate, mostly 5-10 cm long, deep green, erect to ascending or spreading, the lowermost and uppermost shortest and more erect, the lowermost tending to be scattered along the stem, the median and upper more often in whorls of 3-5, the apices acute to acuminate, the margins entire but closely or distantly scabrid (as are the main veins beneath), the bases cuneate or acute.

Inflorescence.--Flowers 1-5, (-8), nodding on leafless or short-bracted, usually elongate peduncles.

Flowers.--Tepals (petals and sepals nearly alike save in position on the flower) lanceolate--mostly 7-10 cm long, to 2.5 cm broad, recurved, dull to golden yellow with a deeper broad, medial line, spotted particularly toward the bases with brown and greenish and toward the base outside.

Filaments slender, greenish-white, 5-7 cm long, projecting forward (downward in regard to the ground) and outward; anthers linear, reddish-brown, versatile, ca. 1.0-1.5 cm long. Style straight, 2.5-5.0 cm long, slender, the stigmatic area 3-lobed.

Fruit.--Not observed.

Distribution and Flowering Season

Swamps, streambanks and bogs, lower Coastal Plain, northwestern Florida (Leon County) westward and northward through southern Alabama. Flowering in August.

Special Identifying Features

Mrs. Henry, who discovered the species, compared it (1946) with other species of southern lilies, with which it might overlap in range and with which it could be confused. (L. catesbaei, the most abundant Coastal Plain lily, is in an entirely different complex of the genus even though sometimes in similar habitat!) Of those species of Lilium with nodding flowers, it is closest to L. superbum which has been found both in northern Florida and southern Alabama in bogs and swamps. However, L. superbum lacks the quantity of scabrousness of leaf and leaf-vein edges or is perfectly smooth. Henry (loc. cit.) suggests a color difference, stating that L. iridollae is more

yellow; however, there are several extremes of color within good L. superbum and thus this character breaks down. L. michauxii resembles some broader-leaved extremes of L. iridollae and also tends to be few-flowered or single-flowered. However its leaves are smooth, its flowers broader, redder, and with a distinctively different fragrance; too, it tends to be a lower plant, with a distinctively upland habitat. L. canadense often has similar leaves, sometimes similar flower color (though it ranges to a strong red, also) but its perianth is not strongly recurved. Thus, while character differences are rather slight, the differences have some constancy.

Habitats and Management Implication

L. iridollae is always on high hydroperiod, acidic substrates, usually a very organic muck or sphagnum peat with sand incorporated. It is found either in light shade in acid swamps or swamp clearings or in full sunlight in open or shrubby, pineland bogs. Associate herbaceous species would be numerous sedges and grasses, other liliaceous plants such as Zygadenus, Tofieldia, Habenaria, Xyris, Calopogon, Eriocaulon, Sarracenia, and other herbs of sphagnum bogs and swamps. Common woody associates would be Cyrilla, Cliftonia, Myrica, Nyssa, Magnolia virginiana, Persea, Viburnum, Rhododendron, Clethra, Acer rubrum, Vaccinium, Gaylussacia, etc. It is thus often at the edge of shrub bogs and swamps, such as are found throughout the slash and longleaf pineland of the region.

While L. iridollae is often in and around thickets it, like several other wetland lilies, loses vigor as woody plant shade increases and the species ultimately dies out through shade and root competition. It is best maintained in swampy or boggy small clearings. Logging of contiguous pine or hardwood would affect it little. Fire would increase it by reducing shrubby competition. Drainage would eliminate this species. All lilies are highly palatable to both deer and cattle and are the first to go with any grazing pressure. The plants vanish quickly whenever swamp or bogs are opened to pasture. As Henry (loc. cit.) comments, hogs gouge up the bulbs and eat them.

Suggested Reading

Henry, M. G. 1946. A new lily from southern Alabama and northern Florida. Bartonia 24:1-4.

Revised March 1980

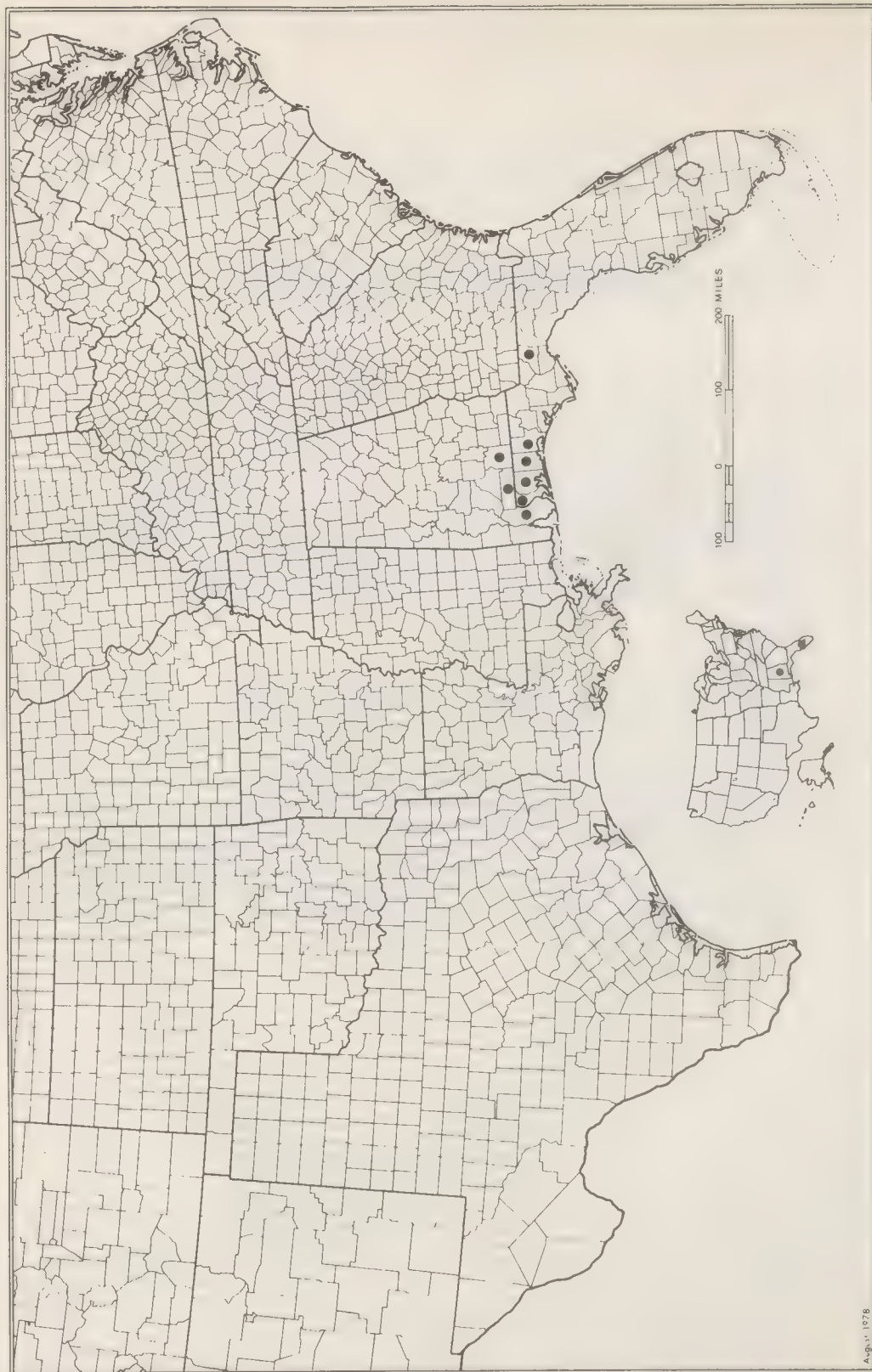
SPECIES: #137 Lilium iridollae M. G. Henry; panhandle lily

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy		X	X	X			X	X
Damage						X		
No lasting effect								
Beneficial if done properly	X				X			

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980



MAP 137 ILIUM IRIDOLLAE

245 LILIACEAE

→ Nolina atopocarpa Bartlett, Florida beargrass

[2-3]

Technical Description

Coarse smooth perennial from a thick, short fleshy rootstock (caudex), this bulblike, surrounded by scalelike leaf bases and by fibrous scales of old leaf bases.

Leaves: Elongate-linear, the longest basal, forming a rosette, spreading, mostly 5-6 dm long, with broad, overlapping bases in a tight low spiral, and narrowing acutely to elongate-linear, gradually tapering, spreading or ascending blades, to 4 mm. wide, these forming strong tufts very like some large cord-grasses, the blade surface strongly parallel-nerved and hard, the margins minutely scabrid. Stem leaves abruptly shorter, distant on the stem, finally reduced to short-linear bracts in the inflorescence.

Inflorescence: Stems 1-few per clump of leaves, mostly erect or ascending, wand-like, round in cross section, above the middle forming either a narrow simple raceme of small, numerous short-stalked flowers or a sparsely branched compound of these racemes. Flowers perfect or unisexual usually 2-3 per node of inflorescence on slender ascending pedicels mostly no longer than 5 mm, each small cluster subtended by an ovate to lanceolate, scale-like bract.

Flowers: Perianth of 6 equal separate spreading greenish-white parts, these elliptic, about 2-3 mm long, 1-ribbed, the tips minutely roughened (papillate), Stamens 6, about as long as the petals and sepals, the anthers broadly oblong-ellipsoidal, equal in length to the filaments or slightly shorter. Ovary superior, broadly ovoid or subglobose, the style absent or nearly so, the stigma with 3 round, broad lobes.

Fruit: Asymmetrically obovoid, usually not all 3 carpels developing seed, thus capsule uneven, 1-3 lobed, no longer than 5 mm, few-seeded.

Distribution and Flowering Season

Pine flatwoods, northeastern peninsular Florida and northwestern Florida (Franklin and Liberty Counties). Flowering in spring and intermittently through the summer.

Habitats and Management Implication

N. atopocarpa frequents slash or longleaf pine-saw palmetto flatwoods, usually where gallberry and myrtle, together with heaths such as blueberry, huckleberry, and Lyonia are also frequent in the shrub overstory. Its bulb-like caudices are set fairly deeply in a black, sandy-peaty high hydroperiod soil. It is usually observed in areas where fires have reduced the shrub understory to promote a savanna-like aspect of grass, sedge and other flatwoods herbaceous vegetation. Logging of the pine either selectively or by clear cutting would effect it little, nor does burning, as mentioned above. Site preparation involving root raking, bulldozing, chaining anything which would modify the soil top layers would have

a negative effect. Bedding, in that it involves disturbance only in strips, would perhaps have the least effect. Of course the pine plantation, once crown closure has taken place, would shade out this species. It has been observed only in clearings or in open, fire-scarred stands in the pinelands. Drainage of the site would also eliminate this, a species of damp substrates.

References

- Bartlett, H. H. 1909. Nolina in the South Atlantic States. *Rhodora* 11:80-82
- Small, J. K. 1933. *Manual of the Southeastern Flora*. 304.

Revised March 1980

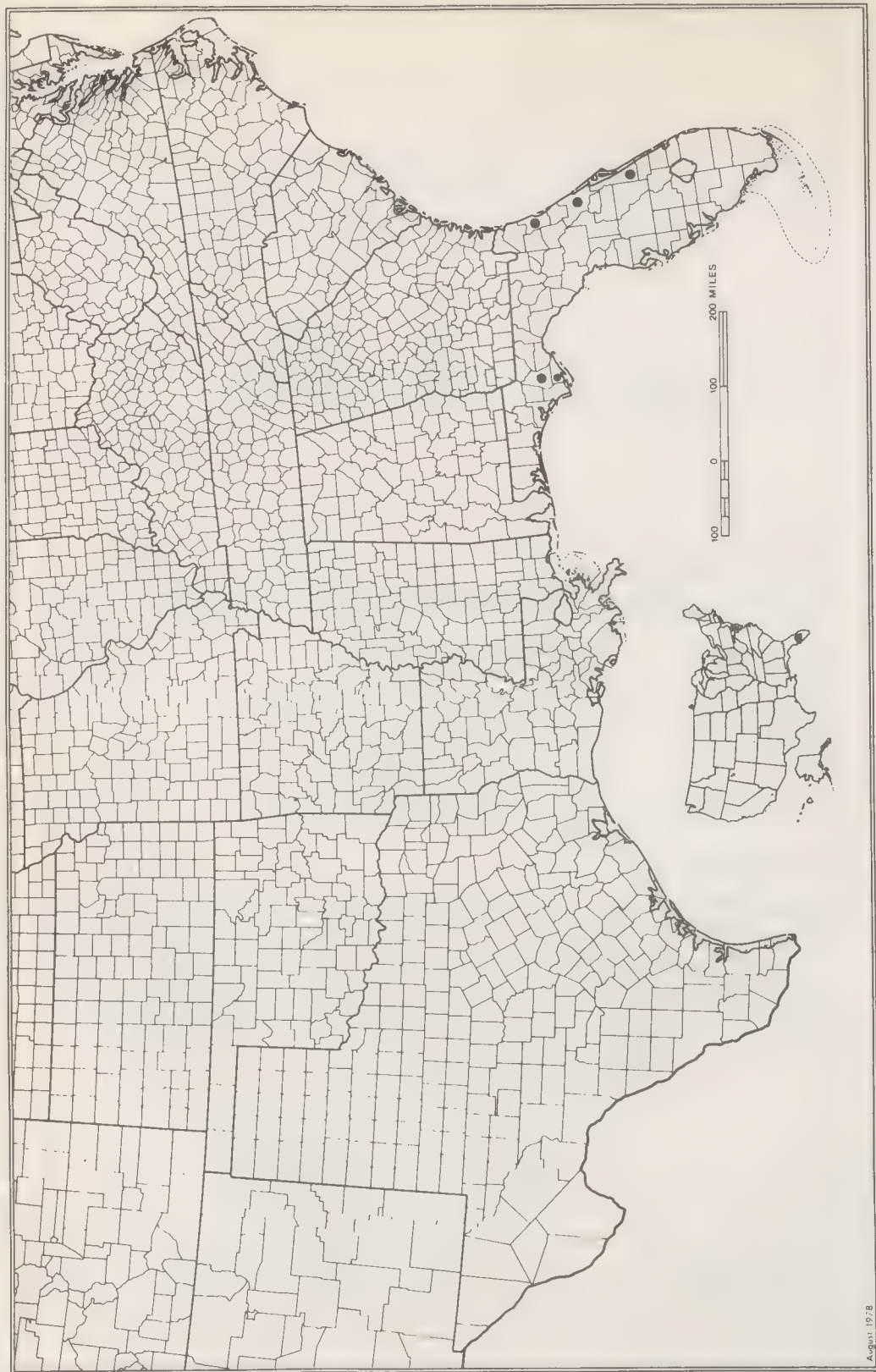
SPECIES: #138 Nolina atopocarpa Bartlett, Florida beargrass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980



MAP 138. *NOLINA ATROPOCARPA*

245
LILIACEAE

Nolina brittoniana Nash, Britton's beargrass

Technical Description

Similar in habit and leaf to N. atopocarpa, but leaves longer, the margins harsher, the tufts of leaves larger.

Stems: Taller, to fully 2 meters or slightly more, stiffer, more often erect, slightly angulate.

Inflorescence: More dense, with shorter more ascending branches, these with numerous, close set flowers, the whole inflorescence elliptic in outline and in bloom showy, white. Pedicels to 1 cm long.

Flowers: Perianth similar to the preceding, but white, the tips strongly papillose.

Fruit: Capsule 8-10 mm long, nearly or quite as broad, strongly 3-lobed, the lobes sharp-angled, the capsule tip and base notched.

Distribution and Flowering Season

Sandhills and dry pinelands, central and southern peninsular Florida.
Flowering in Spring.

Habitats and Management Implication

N. brittoniana is found primarily in the scrublands, either in open long-leaf pine-palmetto or in the sand pine type, and typically associated with evergreen scrub oaks, saw palmetto, various shrub heaths, Osmanthus, Garberia, Ilex, Polygonella. It is usually on deep, well-drained, fine-textured sands. It is a cormophyte, and in association with species adapted to fire disturbance. Therefore cutting of the scattered pine it is in association with would effect it little. The difficulty would be in development to heavier pine cover which would shade out this species, this cover the result of mechanical disturbance of the soil. The least objectionable site preparation would be bedding, if this were to leave strips of undisturbed vegetation.

This species has had its area most depleted through the unfortunate fact that its best sites are also desirable for development both of housing and orange groves. Nearly all of its localities have thus been destroyed.

References

- Nash, G. V. 1895. Notes on some Florida Plants. Bull. Torr. Bot. Club. 22:141-161.
Small, J. K. 1933. Manual of the Southeastern Flora, p. 304.

Revised March 1980

SPECIES: #139 Nolina brittoniana Nash, Britton's beargrass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X	X	X	X	
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X							

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Nolina brittoniana Nash



245
LILIACEAE,

100
~~Schoenolirion wrightii~~ Sherman, Texas sunnybell
~~S. sexanum~~ (Scheele) Gray

Technical Description

Perennial, grass-like, smooth herb, the bulbous base capping a vertical, thick-rooted rhizome.

Leaves.-- All basal and sheathing-based, the outermost strictly scale-like, forming a thin, brownish jacket, the longer ones 2-5 dm long, the blades lineal, mostly 3-5 mm wide, tapering to a narrow but bluntish, angulate apex, with several raised nerves, greenish, the margins minutely papillose; blades toward base gradually widening, straw-colored or near white, their borders thin and broad, clasping.

Inflorescence.-- Scapes erect, mostly 3-6 dm tall, smooth, terete, simple or branching at middle or above, the branches ascending to erect, each subtended by a short-lineal, green, erect bract, and terminating in an elongate, multiflowered, narrow, indeterminate raceme, the slender pedicels upward-arching, in flower mostly 1-2 cm long, each subtended by an ascending, lineal green bract from 1 to 2 cm long (the shortest toward raceme tips).

Flowers.-- Regular, bisexual, nearly 1 cm broad; sepals and petals each 3, distinct, spreading at anthesis, nearly equal (thus perianth tepaloid), elliptic or oblong, ca. 4.0-4.5 mm long, the tips rounded, bluntish, concave, somewhat fleshy, the margins entire, the surfaces medially with 3-4 longitudinal green lines and with broad, greenish-white borders; stamens 6, the erect filaments ca. 3 mm long, lineal but dilating and flattening toward base, the anthers oblong, but with anther pairs slightly divergent, versatile, ca. 2 mm long, yellowish; ovary superior, subglobose, green, the 3 styles united into a lineal, erect slender column ca. 2.5 mm long.

Fruit.-- Capsules trilobed, 4-5 mm broad; seeds globose, 2-3 mm broad, glossy black.

Distribution and Flowering Time

Grassy savannas, swales, northeastern and north-central Alabama, southern Arkansas, eastern Texas. Flowering from late April to early June.

Special Identifying Features

S. wrightii has whitish flowers which, together with its leaves being usually shorter than the inflorescence, distinguish it from S. croceum, a wide-ranging yellow-flowered species whose range it is nested within. The only other white-flowered species is S. albiflorum; this plant of the lower Coastal Plain lacks a rhizome and also has a much more branched inflorescence.

Habitat and Management Implications

S. wrightii is found always on high-hydroperiod, sandy soils, these usually highly organic. It is almost always in full sun, associated with grasses and sedges. Generally it is a part of savanna, the trees being either pines or a mixture of various species of southern yellow pine with hardwoods,

particularly oak and hickory. Such savannas have been maintained over time by fire. The "bog" soils it grows in are eliminated by drainage and the various mechanical site preparation techniques are likewise destructive. Planting with pine likewise is destructive in that ultimate closure of crowns would shade out the herbaceous cover.

References

- Correll, D.S. and M.C. Johnston. 1970. Manual of the vascular plants of Texas. Renner.
- Sherman, H.L. 1969. A systematic study of the genus Schoenolirion (Liliaceae). Unpublished Ph.D. Thesis, Vanderbilt University.
- Small, J.K. 1933. Manual of the southeastern flora: 293-294.

SPECIES Schoenolirion wrightii Sherman. Texas sunnybell

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: drainage of site destroys these plants!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Schoenolirion wrightii Sherman



245
LILIACEAE

100
Trillium persistens Duncan [1] ~~Trillium~~ persistent trillium

Technical Description

Perennial herbs from stocky, short, erect, horizontal or declinate rhizomes.

Stems.-- Solitary (rarely paired) from the rhizome tip, erect from sheathing, scale-like basal leaves, terete, mostly 1-2 (-3) dm long, toward the base pale, upwardly becoming dark green or maroon, or green suffused with maroon, tapering slightly into the bracts.

Bracts.-- 3 (rarely 4), lanceolate to ovate-lanceolate, rarely elliptical, mostly 3-5 cm long (-8), 1.5-2.5 cm wide (-3.5 cm), spreading or slightly declined, usually somewhat folded concavely along the midrib, the apex narrowly acute, to acuminate, the margin minutely papillate-scabrid, the base cuneate, nearly sessile, the midrib accompanied by 1-2 fainter, arcuate pairs of laterals, the upper surface dark green, the lower surface paler, in living specimens slightly glaucous.

Flowers.-- Solitary on a slender, erect or slightly spreading peduncle 1.2-3.0 cm long; sepals 3, distinct, ascending or slightly spreading, lanceolate to elliptic, linear or oblong, 1.0-2.5 cm long, 0.3-0.8 cm wide, apically acute to rounded, edged with a thin, pale band. the bases slightly fused, acutish, the surfaces greenish; petals 3, ascending, linear to oblong, oblanceolate or spatulate, 1.5-3.0 cm long, 0.3-1.0 cm wide, apically acute, sometimes bluntish, somewhat longitudinally folded so that the upper surface is concave (lingulate), the margin entire but somewhat crispate (as in Trillium grandiflorum), the surfaces yellowish-white when young, aging to pink; stamens 6, ascending, mostly 10-11 mm long, the yellowish anthers linear, 5-6 mm long, dehiscent laterally, on linear, flattish, white filaments about as long as the anthers; ovary broadly obovoid, ca. 3.0-3.5 cm long, the wall grooved along the sutures, abruptly pointed into the (2-3 mm long) style, this parted into 3 linear, slightly spreading styles which are 4-5 mm long. Fruit not observed.

Distribution and Flowering Time

Acidic, moist to rather dry hemlock-pine-hardwood coves and ravines usually around Rhododendron, northeast Georgia (Rabun and Habersham Counties) and northwestern South Carolina (Oconee County); flowering from mid-March to mid-April.

Special Identifying Features

As stated by Duncan (1971), this species bears resemblances both to T. catesbaei, a common acidic woodland pedicellate trillium of the southern Appalachians and Piedmont, as well as to T. pusillum, a low-growing pedicellate trillium more often found in hardwood bottoms of the Coastal Plain. However, T. catesbaei is usually a taller plant, with much larger and broader leaves, larger flowers whose petals are of a broader outline and strongly recurved. On the other hand it differs from the similar sized T. pusillum in its differently shaped bracts (more often broadest toward the base rather than elliptic or oblong), its more ascending (rather than spreading) petals which tend to be broadest

at mid-point and above (rather than toward the base), and by its ovary which is obovoid (rather than ovoid), and strongly grooved and winged along the sutures (rather than obscurely angled).

Habitat and Management Implications

T. persistens is an acidic, humified sands derived from metamorphosed granites. The sites are steep, at least strongly sloping, bouldery, shaded by an over-story of white, shortleaf and Virginia pine, Red oak, Chestnut oak, White oak, Sweet gum, Yellow poplar, Hickory, Magnolia tripetala. Hemlock is locally abundant toward ravine bases. The understory toward ravine heads is mainly Kalmia, Rhododendron minus, with R. maximum lower down and interspersed with Hydrangea arborescens. Low bush Blueberries are abundant on the drier, opener sites, common herbaceous associates include Hexastylis, Galax, Epigaea, Viola hastata, V. pallens. The forest has a scattering of merchantable-sized pine (particularly shortleaf), oak, Yellow poplar, Sweet gum, but the steepness of the terrain together with the erodibility of the soils would preclude any but selective logging. Areas where clearing has been done to provide power line rights-of-way, etc., show heavy erosion, together with a dense overgrowth of Rubus, Hydrangea, Sambucus, Lonicera japonica and Pueraria. Where these clearings have been made through trillium populations, no trillium is in evidence.

References

- Duncan, W.H., J.F. Garst and G.A. Neece. 1971. Trillium persistens (Liliaceae), a new pedicellate-flowered species from northeastern Georgia and adjacent South Carolina. Rhodora 73 (794): 244-248.

SPECIES Trillium persistens Duncan, Persistent trillium

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA		X	NA	
Damage	X				X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Trillium persistens Duncan



245
LILIACEAE

→ Trillium pusillum Michx. (complex); ~~least trillium~~

Technical Description

Low rhizomatous, smooth, perennial, the rhizome short oblong or elongate (sometimes forking), pale, horizontal or ascending, 1.5-5.0 cm long, 3-10 mm thick.

Stems.--Solitary or clustered through branching of the rhizome and arising terminally, mostly erect, 1-3 dm tall, slender, terete, greenish, sometimes tinted with maroon, pale toward the base.

Leaves.--Few, all scale-like, thin, overlapping at stem base (actually the "stem" is a peduncle or flower stalk); bracteal leaves normally three, spreading, lanceolate, oblong or elliptic, mostly 2-5 cm long, (rarely to 9.0 cm), the tips narrowed but blunt, the margins entire, the bases acute, sessile or nearly so, the upper surface dark green, three to five-impressed-nerved, the lower surface paler, raised-nerved.

Inflorescence.--Flower solitary, nearly sessile on the bracteal leaves or raised on a slender erect stalk to 3 cm long.

Flowers.--Sepals 3, equal, spreading or somewhat ascending, lanceolate-oblong or elliptic, blunt-tipped, 1.5-4.0 cm long, green. Petals 3, lanceolate, ovate-lanceolate or ovate, 1.5-3.0 (-3.5) cm long, blunt, at first ascending with outbending tips, white, lengthening and narrowing, becoming spreading, even slightly recurved between the sepals in age, deepening through pink, and rose to purple. Stamens 6, erect, the filaments white, flattened-linear, about 5 mm long, the anthers erect, linear, about as long as the filaments or slightly longer, dehiscing laterally. Ovary superior, ovoid, white sometimes suffused with purple, the slender but fleshy style branching mid-way, into 3 linear, spreading-ascending stigmas, the ovary body grooved and wing-angled along the sutures (carpel contacts).

Fruit.--Broadly ovoid or roundish, pale yellow-green, about 1 cm broad.

Distribution and Flowering Season

There are three varieties, distinguished on slight grounds, namely:

1. Trillium pusillum var. pusillum whose main range includes the Atlantic Coastal Plain from North Carolina southward into South Carolina with outliers in northern Alabama, middle Tennessee, and Kentucky. This variety has definitely stalked flowers, and bracteal leaves which are mostly three-veined.
2. Trillium pusillum var. virginianum Fern. (an endangered species) of tide-water Virginia, whose flowers are sessile or nearly so and whose petals are shorter than the sepals. This and the type variety are usually in low, alluvial woodlands.
3. Trillium pusillum var. ozarkanum (Palmer & Steyermark) Steyermark, with leaves, sepals and petals averaging broader and longer, with leaves mostly five-veined rather than three-veined. This last variety is more typical of upland hardwood forests of the southern Ozarks of Missouri. All varieties bloom early, from March into April.

Special Identifying Features

The complex is quite similar to another dwarf trillium, T. nivale, of the Interior Lowlands, mainly the midwest. This species of rich hardwood forested (mostly hard maple, red oak, white oak) ravines, drained bottoms, shaded ledges can often be aspect dominant locally from Pennsylvania west to Minnesota, south to Kentucky and Missouri. T. nivale differs mainly in its petioled bracteal leaves, its narrower filaments, its recurved fruiting stalk. Its fruit, rather than being wing-angled along the carpel sutures, is more obtuse-angled.

Habitats and Management Implications

All of the T. pusillum varieties are shade plants; var. pusillum and var. virginianum are typically in hardwood bottoms and swamps, not in those areas which are permanently inundated, but those which have high, though moist places. In some situations they may be crowded around the bases of larger trees where the ground is a bit higher; in other bottoms they may be scattered or abundant throughout. In any event, the alluvium is sandy and fertile, at least moist save in the driest periods. The outlying populations of var. pusillum in Tennessee and Kentucky are on rich ledges or even on ridgetops in upland forest. Var. ozarkanum is strictly an upland plant, according to Steyermark (1963) "in acid soils of shallow draws in thin cherty-flinty soils of oak-hickory, oak-hickory, oak-pine, or oak-chestnut woodland."

Clearcutting, often recommended for mixed bottomland hardwoods, the type in which var. pusillum and var. virginianum are found, would adversely affect these herbs for two reasons. Such disturbance would at least temporarily increase the amounts of water in the area logged, thus creating too wet a soil. Also, the amount of undesirable brush and vines would increase (i.e., Smilax, Lonicera, Rubus) together with rank herbaceous growth, while the Trillium are found in are found in relatively "clean" bottoms. Lastly, the Trillium are shade plants, not heliophytes. Undoubtedly these plants are rarer today because of clear-cutting of the bottoms within their range. In the cherty uplands frequented by some populations of T. pusillum pusillum and all T. pusillum ozarkanum, clear-cutting would admit both undesirable brush and weed competition, as well as light. Group or single tree selection would be far less harmful. Any mechanical site preparation following clearcutting would cause too much soil disturbance. Opening up of these habitats to grazing of any sort would also be a negative factor; Trillium simply do not persist in grazed forests.

Suggested Reading

Fernald, M. L. 1943. Virginia botanizing under restrictions. Rhodora 45:357-413.

Fernald, M. L. 1950. Gray's manual of botany, ed. 8, pp. 443-446.

Gates, R. R. 1917. Systematic study of Trillium. Ann. Mo. Bot. Gard. 4:43-92.

Steyermark, J. A. 1963. Flora of Missouri, pp. 443-448.

Revised March 1980

SPECIES: #140 Trillium pusillum Michx. (complex); least trillium

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy	X (NA)	X	X	X	X	X	X	X
Damage								
No lasting effect								
Beneficial if done properly								

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

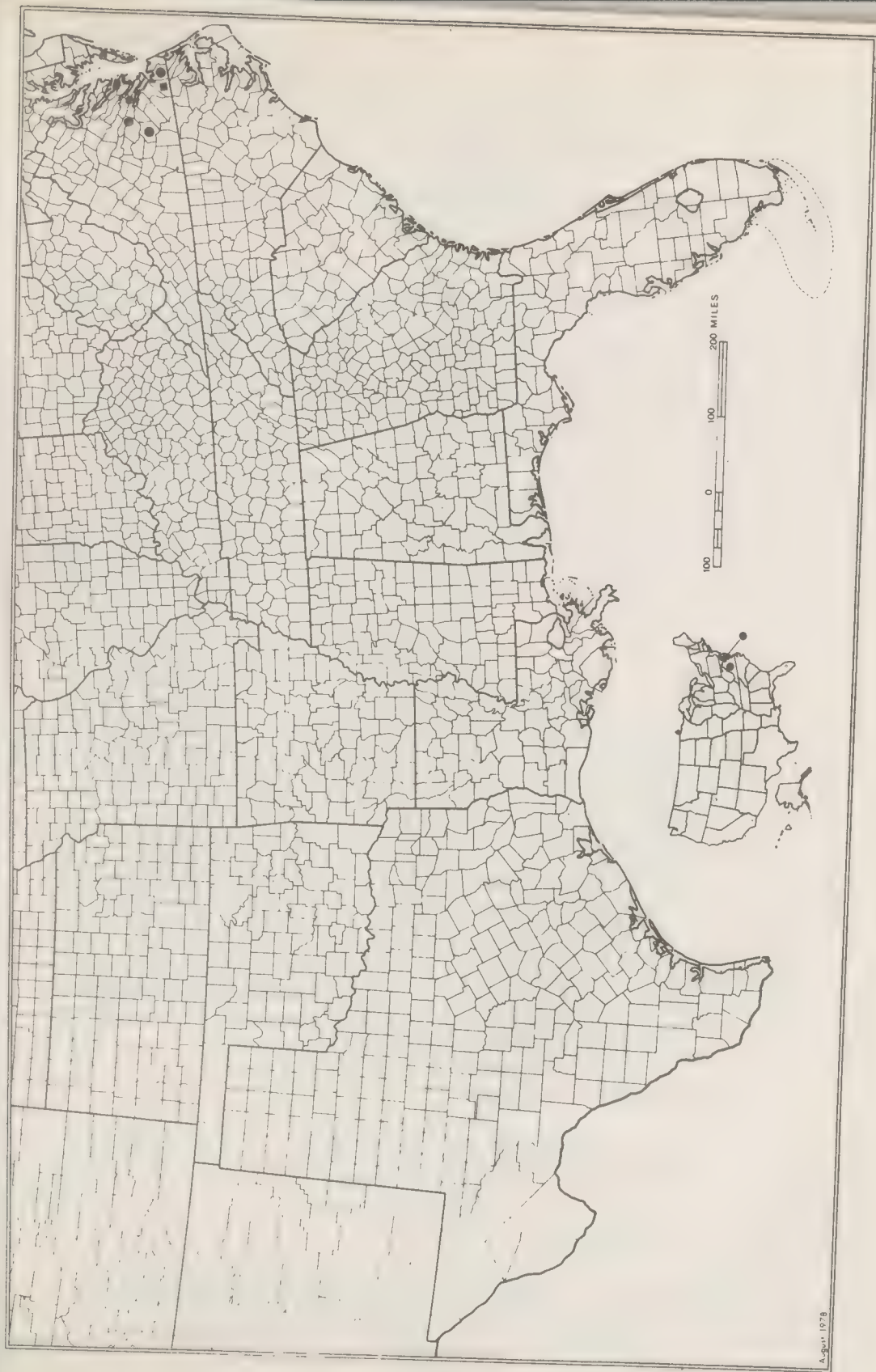
Revised March 1980

Trillium pusillum Michx. var. ozarkanum



Trillium pusillum Michx. var. pusillum





MAP 140C. TRILLIUM PUSILLUM VIRGINIANUM

245 LILIACEAE!

Trillium texanum Buckley Wake-robin

Technical Description

Strongly clonal, with clones of often several hundred shoots (many merely with leaves) arising from narrow, pale, deep-set, horizontal to ascending terete rhizomes 5-10 mm thick and often to 1 dm long.

Scapes.--Stiffly erect or ascending from a bowed base, mostly 1-2 dm high to level of bracteal leaves, fleshy, often strongly tinged with red, smooth, terete with many low ribs, gradually tapering from a base ca. 4-5 mm thick, this sleeved by a thin, tan, erect rhizomal scale-leaf.

Bracteal leaves.--Mostly 3, spreading-ascending, oblong, lance-oblong or elliptic-oblong, ca. 5-10 cm long, mainly 1.5-2.5 cm wide, apically usually broadly rounded, the bases narrowly cuneate to attenuate, often narrowed to short, petiole-like stalks, the surfaces grayish-green with stomates evident on the upper surfaces and with 5 longitudinal veins evident.

Flowers.--Solitary, ascending or nearly spreading horizontally on ascending, slender but stiff, greenish or reddish-green stalks 2-4 cm long; sepals spreading-ascending at anthesis, usually 3, lance-oblong, 2-3 cm long, blunt, with color and stomates as in bracteal leaves, becoming more erect by fruiting time; petals usually 3, at early anthesis white, ascending, at late anthesis more spreading and turning pink, ovate or lance-ovate, 2-3 cm long, narrowing to a narrow but blunt tip, the margins somewhat wavy, the base broadly cuneate or short-clawed; stamens 6, 10-12 mm long, the anthers oblong-linear, 6-8 mm long, introrse, with connectives purplish-tinged, on somewhat flattened, ascending pale filaments; ovary pale green (with a few rows of stomates) ovoid, ca. 3 mm high, tapering to a deeper-green, erect, fleshy, lineal style ca. 2 mm long, the stigmas ascending, excurvate, lineal, ca. 3 mm long, pale green, the stigmatic surface granular.

Fruit.--Body of fruit ovoid, 7-8 mm long, yellow-green, with 6 low ribs evident at the narrow apex, the style persistent as a slightly tapering beak; seeds (fide Dr. Freeman!) 8-15.

Distribution and Flowering Season

Acid hardwood bottoms, sphagnous wooded seeps and branchbanks, northwestern Louisiana and eastern Texas; flowering from March into mid April.

Special Identifying Features

There are three other low, white-flowered trilliums native to the southeastern United States, these all placed by most specialists as varieties of T. pusillum Michx. Trillium pusillum var. pusillum and T. pusillum var. ozarkanum (Palmer & Steyermark) Steyermark

range nearest T. texanum, the former being found in the Coastal Plain of Mississippi, the latter mostly ozarkian but also found in the Ouachitas of southwestern Arkansas. Occasionally both of these varieties may form small clumps by means of rhizomal branching but neither develop the large "solid" patches that are formed by T. texanum, which also has a much longer and usually more slender rhizome. When living plants are compared, T. texanum stands out even at a distance because of the paler green of its bracteal leaves and sepals, the "grayness" being imparted by the abundance of stomates on the upper as well as lower surfaces. The outline of bracteal leaves is also distinctive, those of T. texanum tending more toward oblong, sometimes even broadest above the middle, and with bases more strongly tapering. The petals of T. pusillum tend after anthesis to deepen to deep purple, to become very narrow and involute, are strongly recurved, pointing downward between the erect sepals; those of T. texanum do not deepen as much in color, often do not recurve. The fruit of T. pusillum is much more strongly ribbed than is that of T. texanum. In habitat T. pusillum pusillum is mostly low rises in large bottomlands or, if upland, area where the soil is heavy. T. pusillum ozarkanum takes more upland, acidic soils, being commonest in area where chert gravel is predominant; when it is found in ravine bottoms or stream bottoms, usually the soils are well drained and cherty.

Habitat and Management Implications:

Trillium texanum is found invariably in moist to wet sites and is definitely a shade plant. Most known localities would be characterized as boggy, usually the seep borders of ravine streams with plenty of Alnus, Myrica, Cornus, Vaccinium, Itea in the shrub layer and with green and pop ash, red maple, bottomland oaks, mostly in the willow oak complex, also much red gum, black gum and lowland hickory and elm. Magnolia virginiana is almost always present, some of merchantable size. Of pines, P. taeda is often present, sometimes abundant. Associated herbaceous species include a variety of lowland grasses and sedges, bog orchids (particularly rein-orchids), rushes, bog violets (particularly Viola primulifolia, sometimes Parnassia asarifolia). Lowland ferns in Osmunda, Thelypteris, Athyrium, Woodwardia, Onoclea are frequent to abundant. Sphagnum species often mat the ground. The trillium may also occur in broader bottoms, usually on sandy-silty rises where there is some drainage but where the ground remains moist, such as would be found along the small tributaries to larger meandering streams.

The habitat of this trillium is threatened in two main ways. The larger bottoms, where this plant may be quite local, are being drained, clearcut, converted to pine. The soil disturbance, loss of soil water and admittance of too much light all are destructive of trillium habitat. Opening up such tracts for woodland pasture similarly destroys trillium. The other, and prevalent, danger is apparent when one visits the sandhills ravine habitat. Much of

east Texas sandhills is forested with low grade oak and hickory, or these mixed with pine. Huge tracts of sandhills are now being cleared, site prepped for pine plantation. Although this is itself not trillium habitat, the erosion from such large preparations results in the small branch bottoms which are true trillium habitat being buried by sandy wash. This often kills much of the bottomland hardwood reproduction and even larger trees; it also buries herbaceous cover to such an extent that nothing but a deep layer of wash is evident.

Thus preservation of Trillium texanum heavily depends on recognition of existing sites for it, preserving these from any logging save single tree selection, prevention of any drainage ditching, excluding any livestock use, recommending to those who log adjacent uplands that they leave a sufficient strip of undisturbed timber downslope so as to protect the small stream bottoms.

References

Buckley, S. B. 1860. Description of several new species of plants. Proc. Acad. Nat. Sci. Philad. 12: 443-445.

Correll, D.S. and M.C. Johnston. 1970. Manual of the vascular plants of Texas, p. 408. Renner, Texas.

SPECIES Trillium texanum Buckley. Wake-robin

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X	X	X
Damage No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments: Draining the boggy habitat would destroy
 this trillium!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Trillium texanum Buckl.



215
LILIACEAE

Veratrum woodii Robbins in Wood, Woods' false hellebore

Technical Description

Perennial herb from a thick-rooted, stout, bulbous rootstock.

Stems.-- Erect, single from the bulb, at base to 2 cm thick, usually encased in old, brown fibrous, overlapping leaf bases, the exposed portions terete, pale yellow-green, with a scattered pubescence of weak, fascicled hairs, gradually narrowing upward, there terete or somewhat angled, also slightly ribbed, scattered-pubescent.

Leaves.-- Rosette leaves arising from lateral shoots buds, emerging in winter or early spring, mostly 5-6 dm long, with half the length petiole, the blades mostly elliptical or broadly oblanceolate, mostly 4-8 cm broad, acute, entire, attenuated to the long, clasping-based petiole, strongly parallel-veined, the upper surface toward the base numerous, overlapping, spreading, the lowermost similar to rosette leaves, all spirally arranged, lowest often withering by flowering time, upward on the stem narrowing, mostly linear, shortening and more distant, in the inflorescence short-linear or lanceolate, each subtending an inflorescence branch.

Inflorescence.-- Flowers very numerous in an erect panicle of racemes, the whole structure narrow, up to 1 meter long, each branch ascending, sharply ribbed, puberulent with pale weak hairs and with numerous flowers from near base to tip, each pedicel subtended by a papery, boat-shaped, ovate, scale-like bract ca. 3.0-3.5 mm long, this ciliate and with puberulence along its ribs on the back; pedicels to 5 mm long, crisped-puberulent, ascending.

Flowers.-- Regular, bisexual or some in a plant strictly male; tepals 6, the petals somewhat longer, all spatulate or oblanceolate, the backs crisped pale-puberulent, the surfaces maroon; stamens 6, filaments slender, maroon, erect or ascending, to 5 mm long, the anthers broadly ovoid, short; ovary superior, 3-carpellate, ovoid, 3-4 mm high, 3-lobed, the acute carpel tips distinct, the styles distinct, lineal, spreading or spreading-recurved.

Fruit.-- Capsule lanceolate, erect, fully 1.5 cm long, strongly 3-lobed and angled, dark reddish-green, externally with a scattering of fascicled hairs; seeds several, strongly wing-margined.

Distribution and Flowering Season

Rich sandy mesic woodlands, in the Southeast from the Cumberlands of Kentucky southward through the Cumberlands and Blue Ridge of Tennessee thence intermittently through various provinces of Georgia into southwestern Georgia and northwestern Florida; wooded summits and coves in the Interior Highlands of Missouri and Arkansas; Iowa; Illinois; Indiana.

Special Identifying Features

V. woodii is closest to V. parviflorum Michx. of similar habitats but more confined to the Appalachians from southwestern Virginia southward into northern

Georgia and Alabama. This last tends to have broader leaf blades, smaller flowers (the petals rarely much longer than 5 mm) whose perianth is greenish on pedicels more than two times as long as the subtending bracts. Also the inflorescence branches in V. parviflorum tend to be more spreading, the inflorescence therefore broader, more diffuse. Both of these species, but particularly V. woodii, are sporadic-flowering, so that almost every population has but few flowering shoots, none at all some seasons. Some confusion as to flower color for V. woodii exists, in that while the freshly emerged perianth is maroon, it does often change to green later, particularly in fruiting specimens.

Habitat and Management Implications

V. woodii is invariably in rich mesic woodlands, its bulbs rather deeply set in moist, well-drained, sandy loams. In Kentucky, Tennessee, and in north Georgia the overstory is often hemlock-hardwood, the hardwoods being a mixture of Quercus such as Q. rubra, Q. alba, Liriodendron, Aesculus, Tilia, Fraxinus, Carya (cordiformis), etc. In the highlands of Missouri and Arkansas the overstory is mainly mixed oak-hickory. In southwestern Georgia and northwestern Florida the plants are found under a mixture of Magnolia grandiflora, Fagus grandifolia, Acer, with a scattering of Spruce pine or Loblolly pine. The herbaceous associates are those usually found in rich deciduous woodlands and include species in the genera Hepatica, Ranunculus, Polemonium, Lilium, Sanguinaria, Polygonatum, Smilacina, Erythronium, Tradescantia, Thaspium, Phlox, etc., together with several genera of woodland ferns including Adiantum, Polystichum, Asplenium, Athyrium, Woodsia. The Veratrum is often in populations of hundreds of plants but the populations may be extremely local. The plants appear to be intolerant of full sun, so that areas contiguous to good populations and which doubtless contained Veratrum but were clearcut now lack the species. Veratrum are considered poisonous and it is to be assumed that they are not eaten by livestock.

References

- Fernald, M.L. 1950. Gray's manual of botany, ed. 8 pp. 427-428. Boston, MASS
- Small, J.K. 1933. Manual of the southeastern flora, pp. 276-277. Chapel Hill, N.C.
- Wood, A. 1855. Classbook of botany, ed. 41, p. 557. New York, N.Y.

SPECIES Veratrum woodii Robbins. Wood's false hellebore

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X		X	X (if pine) *	
Damage	X							
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments: *plants mechanically damaged by trampling; plants considered poisonous!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Veratrum woodii Robbins in Wood



245
STEMONACEAE

→ Croomia pauciflora (Nutt.) Torr. ^{E-J.} A few-flowered
~~croomia, Croomia~~

Technical Description

Smooth perennial herb forming large clones by means of shallow, pale, elongate rhizomes.

Stems.--Erect, terminating rhizomal branches, mostly 1.5-3.0 dm tall, slender, round, about 3 mm thick, green, often with tints of red, the lower part loosely sheathed by scale-like leaves, otherwise leafless to near the summit, there with 4-6 spreading leaves.

Leaves.--Alternate but often so close-set as to appear whorled (the plants look very much like some of the herbaceous smilax!!). Leaves spreading in all directions on petioles mostly 2-3 cm long, the blades ovate, elliptic or oblong, mostly 6-10 cm long, thin, yellow-green, acute or short-acuminate, entire, the bases cordate or auriculate, the veins palmate.

Inflorescence.--Flowers small, actinomorphic, about 0.5 cm across, usually 1-2 cm toward the summit of slender spreading or nodding stalks 2-3 cm long from the leaf axils, the stalk usually with 1 small, thin bract at or above its middle, this subtending the lower flower if there is one, this lower flower on a shortish pedicel 2-5 mm long.

Flowers.--Perianth greenish, of 2 sepals and 2 petals, these alike except for position, spreading horizontally, fused at their bases, narrowly ovate, 3.5-4.5 mm long, acute, entire. Stamens erect, 4, distinct, the filaments stout, oblong, 1.0-1.5 mm long, bowed slightly inward, the yellow anthers oblique on the filament summits, short-oblong, their bases pointing inward. Ovary superior, ovoid, between 0.7 and 0.9 mm long, greenish, 1-celled with few ovules and with a fleshy sessile stigma.

Fruit.--A somewhat fleshy, 2-valved ovoid, greenish capsule about 1 cm. long or slightly longer, with the perianth persisting around its base. Seeds few.

Distribution and Flowering Season

Rich loamy soils over limestone, usually in shade of mixed hardwoods, southern and western Georgia through most of the calcareous districts of Alabama in the Appalachian trend and southward infrequently into northwestern Florida. Flowering from late March into May.

Special Identifying Features

As mentioned in the description, Croomia plants vegetatively look much like some of the smaller herbaceous Smilax but differ in having fewer perianth segments, fewer stamens, and having the fruit a capsule rather than a berry.

Habitats and Management Implication

Croomia plants are almost always found on moist, very humified, well drained circumneutral soils under rich deciduous forest, mostly in

the mixed mesophytic type. They are invariably in association with such spring flowering herbs as Trillium, Hepatica, Sanquinaria, Erythronium, Actaea, Podophyllum, Dentaria. There they form scattered but quite large clones consisting often of hundreds of stems. Like so many other spring herbs of this type which flower before the overstory canopy is full they tend to die back to the root toward the summer.

Selective logging of the mixed mesophytic overstory would probably not much effect this species. Heavy logging or clear cutting with the attendant heavy soil disturbance and erosion, particularly also with the admission of more light with subsequent heating and drying of the soil would eliminate this plant. Such would either be through changing of the soil by lowering humus content as well as fertility, or through promotion of light tolerant woody weeds such as Smilax, Rubus, Lonicera, etc. which would crowd out the plants. The plants, probably more through trampling and subsequent erosion, do not hold up well when the forest is opened to grazing livestock. Thus, either through excessive timber cutting or conversion of woodlots to pasture, the distribution of Croomia within its range has been drastically reduced.

References

Small, J. K. 1933. Manual of the Southeastern Flora, p. 309.

SPECIES: #152 Croomia pauciflora (Nutt.) Torr.: Croomia

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy						X		
Damage							NA	
No Lasting Effect	NA			→	X			
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Croomia pauciflora (Nutt.) Torr.



245
AMARYLLIDACEAE

Hymenocallis coronaria (LeConte) Kunth Stream-bank spider-lily
Pancratium coronarium LeConte

Technical Description

Smooth perennial herbs to fully 1 m tall from tunicated (jacketed) ovoid bulbs to 1 dm long, 8 cm broad, these increasing by direct division rather than stolons, thus the plants are often in clumps, as are most Narcissus.
Leaves.--Basal, fleshy, linear-lorate, to 8 dm long, 5 cm wide, narrowing shortly above the sheathing bases, dilating apically then narrowing to an acute apex, the margins entire, the surfaces bright deep green, the upper troughed save at the apex where flat.

Inflorescence.--Scapes mostly 8-10 dm long, stiffly erect, but spongy, to 2 dm thick, pale green, terminating in an involucre of several papery (at first green) suberect narrowly triangular to lance-linear, acuminate bracts mostly 4-8 cm long. Flowers mostly three to five in a headlike cluster, their bases hidden by the involucre.

Flowers.--Perianth tube in bud at first short, then elongating rapidly to fully 7-8 cm long, slenderly cylindrical, greenish or yellowish-white. Perianth segments six, elliptic-linear or lance-linear, 8-9 cm long, to 1 cm broad, spreading, white. Corona very broadly cupshaped, fully 1 dm broad, white, the six, whitish, elongate filaments arise and spread outward fully 2 cm from the corona edge between broadly two-dentate sinus rims. The inferior ovary develops into an ovoid, obscurely three-angled capsule 1.5 cm long.

Distribution and Flowering Season

Rocky or gravelly shoalwaters, banks or bars of swiftly flowing streams and rivers in the Piedmont and inner Coastal Plain, Georgia and Alabama. Flowers in May.

Special Identifying Features

The taxonomy of the genus Hymenocallis is perhaps more confused than that of any other North American genus of comparable size, much of it being based on the character of the flowers which themselves are poorly preserved on most specimens. Therefore, the Hymenocallis referred to here is called H. caroliniana, H. crassifolia, H. occidentalis, depending on the reference consulted. Whatever the case, this particular species is, for a Hymenocallis, distinctive, and it occurs in a distinctive habitat.

Habitat and Management Implication

H. coronaria is always on bars, banks or in shoalwater of clean, rapid streams. Often, its bulbs are rooted in cracks between tips of upended strata in streams.

or in muck-filled solution pockets in shallowly submersed rock. The bulbs increase like those of Narcissus, developing sessile offshoots, thus clumps of bulbs result. This is also the habit of the much more widespread H. occidentalis, but that species flowers in mid and late summer, has much smaller flowers, and, while it can occur in marshes it is also in upland situations.

The greatest threat to H. coronaria comes from disturbance of streams and streambanks. At one time, it must have been abundant in streams where they dropped over the fall line in Georgia. The damming up of such streams has, of course, destroyed the plants. Mechanical disturbance of streambanks has doubtless also taken its toll.

Suggested Reading

Fernald, M. L. and Bernice Schubert. 1948. Studies of American types in the British Herbarium, part III. *Rhodora* 50:193-194.

Kunth, C. S. 1850. Hymenocallis in *Enumeration Plantarum* 5:855.

LeConte, J. E. 1836. Pancratium in *Ann. Lyc. N. Y.* 3:145.

Revised March 1980

#135 *Hymenocallis coronaria* (LeConte) Kunth,
SPECIES: stream-bank spider lily

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy	NA	NA	NA	NA	NA	NA	NA	NA
Damage								
No lasting effect	NA	NA	NA	NA	NA	NA	NA	NA
Beneficial if done properly								

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Hymenocallis coronaria (Leconte) Kunth



245
AMARYLLIDACEAE:

Paper 142
Text & map by:
Robert Kral

→ Zephyranthes simpsonii Chapm. Rain zephyr lily;
Atamasco lily; zephyr lily

Atamasco simpsonii (Chapm.) Greene

Technical Description

Glabrous perennial herb at most to 3 dm. tall arising from a thin-jacketed bulb (as in Narcissus).

Leaves.--Linear, basal, overlapping by sheathing bases, the blades elongate-linear, numerous, spreading, fleshy, a lustrous green, sometimes tinted with red, about 2 mm. broad, around 2 dm. long, the backs rounded, the edges rounded and smooth, the upper surface grooved.

Inflorescence.--Scapes 1 or few (the bulbs solitary or in small clusters), erect or spreading, broader than the leaves and often appearing as they die, terete or somewhat flattened, pale green with tinges of red toward the apex and terminating in a tubular, reddish-purple bract which includes the single bud. The bract splits as the bud open, becomes darker red and is 2-cleft half its length or more.

Flowers.--Symmetrical, erect, showy, 5-10 cm. long, the tepals (the 3 petals and 3 sepals similar except in position) arising from a tubular base, oblong-lanceolate, short-acuminate, opening white, sometimes tinted with pink, aging through red to purple, spreading only slightly, stamens 6, erect, the elongate white filaments arising from the perianth tube apex, the oblong-linear anthers yellowish. Ovary inferior; style elongate, slender, branching at its summit into 3, short-linear stigmas at about the level of the anthers.

Fruit.--A 3-lobed capsule; seeds few, semicircular, a lustrous black.

Distribution and Flowering Season

Wet clearings in pine-saw palmetto flatwoods, savannas, pasture, roadsides, central and southern peninsular Florida. Flowering February to April.

Special Identifying Features

There are but 3 native species of Zephyranthes in the southeast, of which the commonest and most widespread is the Atamasco Lily, Z. amasco (L.) Herb. This is a clump former of rich bluffs and low rich woods with broader, longer leaves and larger, often broader and rounder tepals, and generally with less red pigments; its stigma branches arise at a level well above the anthers in the mature flower. The other species, also considered threatened, is Z. treatiae S. Wat. (Atamasco treatiae (S. Wats.) Greene which is in wet pine flatwoods from central peninsular Florida northward and westward to Gadsden Co., Florida. This is very similar to Z. simpsonii in leaf and flower character, the leaves being but slightly broader, the tepals tending to spread apart further in full flower. A significant difference is in the level the stigma lobes are presented

which is, as in Z. atamasco, well above the level of the anthers.

Habitats and Management Implication

Z. simpsonii and Z. treatiae are both species of low pine flatwoods or pine dotted savannas, here locally abundant in black, highly organic sands. Both, in undisturbed flatwoods, flower sparsely as competing herbaceous or shrubby vegetation increases; both respond with vigorous flowering after fire disturbance. Both species are now more commonly seen on moist to wet mowed roadbanks or in pastures which were formerly pine flatwoods, here grazing or mowing appearing to operate effectively to reduce competition of other plants. In that both species appear to move to such artificial situations, and to increase dramatically there, they are less threatened than might appear from the abuse of their original habitat. However, efficient drainage will cause a decrease even of the roadside populations, these being plants of quite moist soils. Site preparation involving major soil disturbance or drainage ditching will reduce the populations. Clearcutting itself will at least temporarily increase both.

References

- Godfrey, R.K. and J. Wooten. 197-. Aquatic and wetland plants of the southeastern United States. Zephyranthes, in unpublished Manuscript.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 320-321. Chapel Hill, N.C.

SPECIES: #142 Zephyranthes simpsonii Chapm.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								
No Lasting Effect								
Beneficial if Done Properly	X				X	X		X

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Zephyranthes simpsonii Chapm.



245
IRIDACEAE:

→ Nemastylis floridana Small. ¹⁻³ Fall-flowering plant leaf,
 celestials or celestial-Lilies

Technical Description

Tall (to 1.5 meters) slender, smooth erect or leaning, wandlike and grasslike plants from ovoid bulbs up to 2 cm broad, the outer scales dark reddish-brown, ovate, acuminate, the innermost scale leaves somewhat longer-tipped.

Stems.--Terete, at most 4 mm thick, tan or pale yellow-green glaucous, flecked with maroon, the nodes slightly swollen, few and distant.

Leaves.--Basal and lower stem leaves pale green very elongate-linear, rarely more than 5 mm broad, to 7 dm long, narrowly attenuate-involute at the tips, the margins entire, the blade bases broadening into open rather short sheathes.

Inflorescence.--A terminal, narrowly and elongate-forking system of long-stalked spathes; spathes 2, overlapping, the lower one shorter, papery-margined, linear, concealing the flower stalks and perianth tubes.

Flowers.--Erect, nearly symmetrical, the sepals and petals spreading horizontally, the flower fully 3.5-4.0 cm broad, blue-violet; perianth segments elliptic to narrowly obovate, the petals slightly smaller. Stamens 3, erect, the filaments very much shorter than the linear (7-8 mm long) yellowish anthers whose tips are coiled. Ovary inferior, short, the 6 style branches spreading, narrow-conic, tapering to narrow stigmas.

Fruit.--Capsule obovoid, ca. 1.5 cm long, truncate, capped with the lobes of the persistent style branch bases; seeds numerous, about 1.5-2.0 mm broad.

Distribution and Flowering Season

Low, sunny areas in flatwoods, also swamp and marsh borders, eastern peninsular Florida, mostly along the St. Johns River southward and eastward. Flowering August into October.

Special Identifying Features

This species is similar to the Iridaceous genus Sphenostigma, which see. The only other species of Nemastylis in the southeast is N. geminiflora a plant of heavy prairie earths to the northwest, and which blooms in the morning. N. floridana has flowers which open at about four o'clock in the afternoon, closing toward dusk.

Habitats and Management Implications

N. floridana is locally abundant from Volusia county southward in wet, grassy, sandy peat or peat-muck clearings in slash pine-saw palmetto, at edges of cabbage palm hammocks, or in broad marshes. It is a plant mostly found in full sun or the light shade of hammock edges and savanna pine. Much of the broad marsh along the St. Johns River is now pastured; the improved pasture does not favor the species in that it forms a closed mass of grass bases and rhizomes. Much of the pine flatwoods savanna where it formerly grew is converted to housing as a result of the space program on Merritt Island and the subsequent expansion of Cocoa and Melbourne. Much of the savanna and marsh has been

systematically drained in any event, and drainage eliminates this species together with the grass-sedge complex it is a part of.

References

Small, J. K. 1931. The celestial lilies. Journ. N.Y. Bot. Gard. 32. 266 and Fig. 2.

_____. 1933. Manual of the southeastern flora, p. 326. Chapel Hill, N.C.

Mackiernan, Janice M. & Elaine M. Norman. 1979, Reproductive biology of Nemastylis floridana Small (Iridaceae). Florida Scientist 4:229-236.

SPECIES: #85 *Nemastylis floridana* Small Celestials or Celestial-Lilies

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X				X
Damage							X	
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Nemastylis floridana Small



Paper 86

Text & map by:

100 Robert Kral

24 IRIDACEAE:

Sphenostigma coelestina (Bartr. ex Willd.) R.C. Foster [1-3],
Bartram's ixia, N.C.N.
Ixia coelestina Bartr.
Salpingostylis coelestina (Bartr.) Small

Technical Description

Erect, perennial, grass-like herb from an ovoid bulb 1.0-1.5 cm broad, the outer bulb scales dark dull brown.

Stems.--Very slender, usually unbranched, often bent at the slightly swollen nodes, greenish, low-ribbed, slightly compressed between the nodes, 2-4 dm long.

Leaves.--Sheath leaves short, narrow, linear, paler brown, erect, thin. Basal leaves 1-3, shorter than the stem, narrowly elliptic-linear, the tips attenuate, the blade somewhat pleated and ribbed, narrowing involutely to a short, mostly open sheath, the sheath bases often strongly tinted with orange-yellow as are the covered bulb scales. Stem leaves reduced, the bases sheathing, the blades to 9 cm. long, 1 or 2, ascending, distant on the stem.

Inflorescence.--Spathes 2, ca. 2-3 cm long, linear, folded-overlapping, thin-margined, greenish, acute, with narrow thin margins tinted at the apex with maroon. Flowers nearly symmetrical, on very slender (narrowly linear) stalks hidden by the spathes, opening laterally to the spathe tip.

Flowers.--Perianth tube very slender, its tip slightly projecting beyond the spathes; perianth segments nearly equal, spreading, pale gentian blue, paler toward the base, oblanceolate or obovate, the tips rounded or (usually) emarginate, the margins entire, the bases cuneate or attenuate to a short claw or sessile at top of perianth tube, the whole flower when fully open fully 5-6 cm. broad. Stamens 3, filaments arising at summit of perianth tube, slender with abruptly flaring thin bases, the anthers yellowish linear-oblong, ca. 4-5 mm long. Ovary inferior, the very elongate slender erect style with 3 narrow, ascending branches these expanded at their tips into 3, fan-shaped, blue-purple, jagged-tipped stigmas projected a cm or slightly more beyond the tip of the perianth tube.

Fruit.--Capsule 1.5-2.0 cm long, erect, short oblong or narrowly obovate, greenish, smooth, projected beyond the spathe tips on a thickened stalk.

Distribution and Flowering Season

Low pine flatwoods, pineland savannas, northeastern Florida. Flowering May, June.

Special Identifying Features

This species, first observed and illustrated by William Bartram, is at a glance most similar to the genus Nemastylis (the Celestial-lilies), but in that genus the anther tips are coiled and the style branches narrow toward the tips, rather than flattened into fan-shaped stigmas. The only Nemastylis that could possibly overlap in range with this would be N. floridana Small, which blooms in the late summer and fall. Also, the Sphenostigma blooms in the morning while N. floridana flowers open toward late afternoon.

Habitats and Management Implication

Sphenostigma coelestina is in high hydroperiod, highly organic (usually black) fine textured sandy soils. It may be in full sun in savanna clearings or in open stands of flatwoods pines such as P. palustris, P. elliotii or P. serotina. Palmetto and gallberry, together with various heaths are common understory shrubs. The associated herbs are mostly grasses and sedges, with a scattering of Xyris, Eriocalaceae, Orchids, Polygala etc. all indicative of the intermittently highly moist soil. Its bulbs, though rather shallowly set in a matrix of grass and sedge roots, seem not to be harmed by periodic fires. Most of the areas where the plants have been seen in abundance have had some recent fire. Occasionally the plants are seen in plantations of pine, usually in evidence where the trees have past the sapling stage and again where there has been a recent burn. Much of the former area of the species has been lost either through expansion of housing, rowcrop agriculture, nurseries, or improved cattle pasture. In most of these events, and in some of the managed tracts of pine, holdovers have probably been destroyed by the drying out resulting from construction of drainage ditches. These soils, on draining, lose much of their organic matter and become dry white sands. This species should be considered endangered rather than merely threatened. Most methods of site preparation involving soil disturbance will eliminate the species, the least objectionable method being bedding.

Interestingly, flowers of the species open at dawn, close at about 10:00 A.M. and during that period make one of the most beautifully conspicuous of mass floral effects. Yet, by late morning and afternoon, when the corollas have withered, the plants seem to disappear, blending into the mass of other grasslike herbs.

References

Foster, R. C. 1945. Contr. Gray Herb. 155:15.

Small, J. K. 1931. Bartram's Ixia coelestina rediscovered.
Journ. N.Y. Bot. Gard. 32:161.

_____. 1931. Celestial lilies. Journ. N.Y. Bot. Gard. 32: 266.

_____. 1933. Manual of the southeastern flora, pp. 326-327. Chapel Hill, N.C.

SPECIES: #86 Sphenostigma coelestina (Bartr. ex Willd.) R. C. Foster N.C.N.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X				X
Damage			X				X	
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sphenostigma coelestina (Bartr. ex Willd.) Foster



245
ORCHIDACEAE;

~~Genus~~ Platanthera (Habenaria, in part) [?].

Several species of Platanthera have been placed on various Federal and State lists of threatened and endangered species. In that the floral structure in orchids is so involved, and to avoid lengthy and repetitive detail for each writeup, I am giving a brief general description of vegetative and floral character for Platanthera.

All Platanthera are perennial, have a fascicle of fleshy, sometimes tuberous roots, and an erect, fleshy, leafy stem, the lowest leaves mostly sheath, those above toward mid-stem larger, with well-developed sheaths and the largest blades, mostly of a narrow outline, while those in the upper part of the stem are usually, often abruptly, much smaller, becoming sheathless, and perhaps best described as peduncular bracts.

The inflorescence is often referred to as racemose, but is actually a bracteate spike of (usually) many flowers, these disposed in an open or tight system, and variously oriented.

The flower in basic construction is a central type for orchids, with a lot of adnation and asymmetry. The ovary is, of course, inferior, tricarpetate, enveloped by and adnate to the floral tube which has a narrowed base, is expanded over the narrowish ovary, then slenderly tubular, quite elongated, and flaring abruptly into the very irregular perianth limb of 3 sepals and 3 petals. The sepals tend to be more uniform, with the upper (dorsal) sepal tending to be more concave and broader, spreading upward and arching forward, and the other 2 flatter, usually narrower, spreading out and downward at an angle of about 45°. The petals are 3, 2 of which are spread upward at an angle of about 45°, with their inner edges usually under the overarching dorsal sepal; the 3rd petal is largest, is referred to as the labellum (lip), and is directed outward and downward. The labellum may be variously shaped, entire or 3-lobed or fringed or in places callused; in the taxonomy of Platanthera, the lip character is probably the most important criterion. At the base of the lip is a small pore, this the opening to a slender-tubular, downward or backward-directed, spur, the dilated base of which produces nectar (reached only by long-tongued insects!) The perianth and male and female parts of this genus, as in other orchids, is coalesced into what is called a "column", which in Platanthera is short, rather broad, capped by a single broad, bilocular anther, the anther sacs each containing a pollinium (a clavate mass of agglutinated pollen

grains) but separated by stigma and connective tissue. On the column face, between the bases of the anther locules, is a stigmatic zone (2 coalesced), which is located just above the opening into the spur. As a long-tongued insect reaches the flower, its face comes into contact with that of the orchid, meeting the narrowed sticky (viscidial) exposed ends of the pollinia and at the same time contacting the stigma. When the insect withdraws, it often pulls away the sticky-ended pollinia, thus insuring pollination of the next flower visited.

The fruit in orchids is always capsular, the seeds minute, with no endosperm; germination must take place soon after the capsule ripens.

245 ORCHIDACEAE;

Platantanthera flava (L.) Lindl.

Habenaria flava (L.) R.Br. [1-2],

Status: Threatened?

Technical Description:

Stems: slender, stiffly erect, 1.5-4.0 dm tall, usually solitary, terete below and multiribbed, usually entirely concealed there by leaf sheaths and to 4 mm thick, pale green, in the inflorescence with low, sharp, papillose ribs, the longer internodes at mid-stem or lower, to 1.5 dm long.

Leaves: in a loose spiral, ascending to erect, the larger foliage leaves 2-4, the lowest usually largest, its tubular sheath somewhat loose, 12-15 cm long, its blade narrowly elliptic or lanceolate, 1-2 dm long, narrowly acute, the margins entire, papillose the base broadly cuneate, folded, clasping, the upper surface a dull deep green, the lower surface markedly paler; leaf blades abruptly smaller, sheathless, sessile upward on stem, margins with the short, lance-triangular-linear inflorescence bracts.

Inflorescence: Spike narrow, 6-15 cm long, about 1.5 cm wide, the flowers ascending in a loose spiral, rather distant in the lower spike, closer in the upper spike at anthesis, each subtended by a green, lanceolate bract (southeastern plants of this species have lower floral bracts no longer than the flower subtended!) mostly 1 cm or less in length.

Flowers: Perianth lobes a pale yellow-green, the floral tube including the inferior ovary short-stipitate, ca. 7-8 mm long, slenderly ellipsoidal-fusiform, the narrowed upper part of the tube pale yellow-green, arching outward, the lower part longitudinally low-ribbed, the floral face directed somewhat downward; dorsal sepal ovate, apically narrowly rounded, concave, cupped forward, ca. 4 mm long, the lateral sepal lobes elliptic-oblong, narrower than the dorsal, ca. 3.5 mm long; lateral petals ovate, somewhat asymmetrical, narrowly rounded apically, projecting upward and forward, their inner edges under the overarching dorsal sepal; lip directed downward and backward, broadly oblong, ca. 4.5 mm long, trilobate, the central lobe much the longest and oblong, its apex broadly rounded or truncate, entire, the inner lip surface bearing medially at its base a thickened wide ridgelike process (tubercle); spur clavate-linear, ca. 10 mm long, curved backward and downward along the perianth tube; column short, 1.5 mm high, its truncate apex oblique and with lateral tubercles.

Fruit: Capsule nearly erect, ellipsoidal, to 8 mm long, finely ribbed.

Distribution and Flowering Season:

Sandy silty alluvium of swamp forest, Coastal Plain, Piedmont, southern Appalachians including Interior Low Plateau, Maryland south to northern peninsular Florida, thence west to eastern Texas, inland to southeastern Missouri, southern Illinois, Western Kentucky, middle and western Tennessee; in the Southeast flowering from late June into early August.

Special Identifying Features:

This inconspicuous Rein-orchid is distinguished from the other southeastern greenish-flowered species by a combination of (a.) fringed labellum (2.) anther cells divergent on column head to either side of compound stigma and (3.) a strong, somewhat alate tubercle at lip base. The description and range given above pertain only to the southern variety "flava", not to the longer-bracted northern var. herbiola (R.Br.) Luer.

Habitat and Management Implication:

P. flava, as mentioned above, is a species of swamp woodland, typically roots in moist to mucky silty sands, in the shade of Bald Cypress and hardwoods such as Salix, Carya aquatica, Populus, various willow oaks, Overcup Oak, Basket Oak, Nuttall or Pin Oak, Shumard Oak, Swamp Maple, Nyssa aquatica, N. biflora, Green Ash, Pumpkin Ash, Carolina Ash, Sycamore, Hackberry, Elm (exact species composition differs from one part of the range to another). Common understory shrubs are Cephalanthus, Sambucus, Itea, Lindera, with Myrica, Ilicium, Leucothoe, etc. present in more southern latitudes. Some common herbaceous associates are various Eupanicum, Dichantherium, Panicum, Glyceria, Leersia, Echinodorus, several carices, including C. stipata, C. debilis, C. bromoides, C. joorii, C. gigantea, C. intumescens, C. crus-corvi, C. lupulina, C. lurida, etc., various Scirpus, Rhynchospora, many Juncus, Commelina virginica and others, Hypoxis (particularly H. leptocarpa), Sagittaria, Echinodorus, Saururus, Rumex, Polygonum, penthorum, Luwwigia, Proserpinaca, Cicuta, Sium, Hydrocotyle, Sabatia calycina, Lindera, Chelone, Micranthemum, swamp woodland Lobelia such as L. Cardinalis and swamp woodland composites. Swamp ferns such as Osmunda, Woodwardia, Onoclea, Athyrium, may be abundant.

From the abovementioned associates it is evident that this orchid grows in places that are very often flooded, sometimes for long periods. Interestingly, it is pollinated by an Aedes mosquito (Luer, 1975), and many herbarium collections still show a fine dust of alluvium placed on them by floodwater!

The greatest danger faced by this particular orchid comes from the wholesale clearcutting of large tracts of bottomland throughout its range. Such cutting results in a raising of water table, thus more than normal flooding of the bottoms. It also results in a conversion from a relatively clean alluvial forest floor to a sunny jungle of invading woody weeds. Another hazard to the orchid comes from conversion of such forest by drainage and clearing either to lowland improved pasture or to row crops, particularly soy beans.

References:

- Correll, D.S. 1950. Native orchids of North America north of Mexico.
Luer, C.A. 1975. The native orchids of the United States and Mexico.
The New York Botanical Garden.

SPECIES: Platanthera flava (L.) Lindl. var. flava

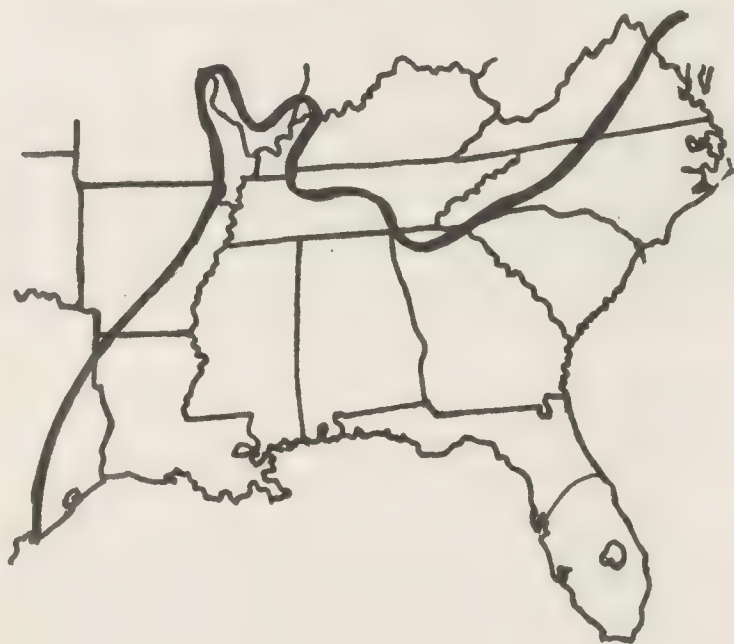
Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy	NA	X	X	X		X	X	X
Damage								
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments: Clearcutting and drainage destroy this habitat.

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Range of:

Platanthera flava (L.) Lindl. var. flava



> Platanthera integra (Nutt.) Gray ex Beck [1-2].

Habenaria integra (Nutt.) Spreng.

Status: Threatened

Technical Description:

Smooth, leafy-stemmed orchid 4-8 dm tall.

Stems: slender, stiffly erect, terete, pale green, finely ribbed, at base in sheath ca. 4 mm thick, the nodes several, the internodes in lower 1/2 longest.

Leaves: in a loose spiral, ascending or erect, the largest ones 1 or 2, the sheaths somewhat loose, overlapping to 2 dm long, the blades somewhat folded, narrowly elliptical or lance-linear, 5-20 cm long, narrowed gradually to the bluntly acute apex, the margins entire, the base narrowly cuneate, clasping; blades and sheaths gradually or abruptly reduced up the stem, the blades becoming lance-linear, sessile, clasping, and merging with inflorescence bracts.

Inflorescence: Spike cylindrical or narrowly conical, 2-10 cm long, the flowers very many (-60) in a series of tight spirals, each bloom subtended by a narrowly lanceolate-subulate green bract, the lower bracts 1.0-1.5 cm long, gradually reduced up the spike.

Flowers: perianth lobes a deep yellow orange, the floral tube including the inferior ovary, stipitate, lance-linear, ca. 8-9 mm long, the expanded base green, the ribs papillose, narrow, the narrowly tubular apex yellowish; dorsal sepal broadly elliptic or ovate, concave, rounded apically, ca. 4 mm long, arching upward and forward, the lateral sepals nearly round or very broadly ovate, blunt-tipped, oblique, ca. 5 mm long; lateral petals elliptic, acute, ca. 4 mm long, their inner edges under the hooded dorsal sepal, the lip oblong-elliptic, very short-stalked, rounded, irregularly crenulate, projecting forward and downward, unlobed, the spur lineal-tubular, projecting backward and slightly downward, more or less parallel with perianth tube, 5-6 mm long; column short (ca. 1 mm), truncate oblique with lateral calluses opposite anther cells.

Fruit: Capsule spreading, narrowly ellipsoidal, the narrow ribs papillate.

Distribution and Flowering Season:

Savanna flatwoods, bogs, sunny sphagnum seepage areas, various provinces but mostly in the Coastal Plain, New Jersey south to northern peninsular Florida, west in the Gulf Coastal Plain to eastern Texas, inland throughout South Carolina, Georgia into southwestern North Carolina, through Alabama into middle Tennessee; flowering from late July into September.

Special Identifying Features:

P. integra looks exactly like P. cristata from a distance, only close inspection revealing that its labellum is unfringed rather than fimbriate.

Habitat and Management Implication:

This is a species of sunny, acidic, usually sphagnum seeps. The substrate is at least moist, highly organic, usually a black sandy peat. In the Coastal Plain it is usually in bogs or low places in pineland, is part of a grass-sedge system high in bog Andropogon, Aristida, Panicum, Calamagrostis, Rhynchospora, Dichromena (D. latifolia), bog carices, etc. Some showy associated herbs include other Platanthera, Pogonia, Cleistes, Xyris, Eriocaulon, Aletris, Lilium catesbaei, Tofieldia, Zygadenus, Sarracenia, Drosera, Rhexia, Sabatia and many composites in Coreopsis, Bigelovia, Liatris, Eupatorium, Aster, Helianthus, etc. In inland provinces it is usually very local, mostly confined to small seeps in clearings, or savanna swales in oak-pine woodland.

Throughout its range it is fire dependent, whatever the overstory forest type, and wherever fire is kept out it is overwhelmed by bog, pocosin, or shrub bay types or shaded out by invading pines and hardwoods.

In that it is a bog plant it is destroyed by establishment of drainage ditches. The greatest threat to it is in the heartland of its range, namely the lower terraces of the Gulf and Atlantic Coastal Plain, much of this once expanses of savanna but now converted to plantation pineland.

References:

- Correll, D.S. 1950. Native orchids of North America north of Mexico.
Luer, C.A. 1975. The native orchids of the United States and Mexico. The New York Botanical Garden.

SPECIES: Platanthera integra (Nutt.) Gray ex Beck

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X			X	X
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: Drainage destroys the habitat.

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Southeastern Range of:
Platanthera integra (Nutt.) Gray ex Beck



245 ORCHIDACEAE;

100

Platanthera integrilabia (Correll) Luer [i. n.]

Habenaria blephariglottis (Willd.) Hook. var.
integrilabia Correll

Status: Endangered

Technical Description:

Stems: stiffly erect, usually 1 per rootstock (but plants tending to be gregarious), terete and ribbed, proximally to 5 mm thick, sheathed by leaf sheaths, pale green.

Leaves: alternate in spiral, the larger foliage leaves 2-3, the sheaths loose-tubular, sometimes to 2 dm long, overlapping the blades narrowly elliptic or lanceolate, to 2 dm long, 3 cm wide, the apex narrowly but bluntly acute, the margin entire, papillose, the base strongly troughed, clasping; leaf blades rather abruptly narrowing and shortening upward into the inflorescence, clasping but sheathless.

Inflorescence: a terminal, rather loose, few-to-many-flowered (-20) bracteate, racemelike spike, round or short-oblong in outline, 4-10 cm long, ca. 5 cm broad, the axis angulately sharp-ribbed, the lower bracts longest, green, ascending, narrowly lance-triangular, to 2 cm long, gradually reduced upward in spike.

Flowers: white, spreading-ascending, very fragrant in evening, the floral tube narrowly linear-fusiform, at anthesis ca. 3 cm long, the body and narrowed base strongly ribbed, minutely scabro-papillose, the narrowed tubular apex greenish white or white, slightly excurved; calyx lobes 3, the dorsal broadly obovate, shallowly cupped, ca. 8 mm long, the laterals broadly ovate, blunt-tipped, more strongly rounded on the lower side, ca. 8-9 mm long; upper 2 petals narrowly oblong or oblong-elliptic, blunt-tipped, ca. 7 mm long, the labellum unlobed, lance-spatulate, the lower part a flat claw, the upper 2/3 erose toward the narrowed apex, the spur linear-clavate, 4-6 cm long, directed downward and curving forward; column ca. 4 mm long.

Fruit: capsule narrowly lance-elliptic, strongly papillose-scabrid, ca. 1.5 mm long.

Distribution and Flowering Season:

Boggy, seepy, usually wooded streambanks and ravines, Cumberland Plateau and southwestern Blue Ridge, southeastern Kentucky southward through middle and eastern Tennessee and southwestern Kentucky southward through middle and eastern Tennessee and southwestern North Carolina into northern Alabama and northwestern Georgia; flowering from late July into early September.

Special Identifying Features:

This orchid was first treated as part of Platanthera (Habenaria) blephariglottis, a more robust bog orchid which also has an unlobed lip. However, the labellum of P. blephariglottis is fimbriately fringed, while that of P. integrilabia is at most shallowly erose-toothed.

Habitat and Management Implications:

This Rein-orchid is mostly a plant of shade, rarely small wet clearings, prefers boggy deciduous forested ravine woods, and a moist to wet sandy peaty silt or sandy peat, this often with a sphagnum mat. The overstory will often be dominated by Red Maple, Black Gum, Sweet Gum, Tuliptree, Willow Oak, Water Oak, Beech, with wild Azalea, Viburnum, Alder, Itea, "Svida" dogwood, Cephalanthus, Sambucus, Calycanthus, Xanthorrhiza, Highbush Blueberry, frequent in varied proportions in the understory. The herbaceous layer is ferny, with Thelypteris noveboracensis, Athyrium, Polystichum, Woodwardia, Onoclea, Osmunda. Also present may be grasses such as Cinna arundinacea, Calamagrostis cinnoides, Chasmanthium, Agrostis, Leersia, sedges such as Scirpus cyperinus, S. polyphyllus, many carices, several Juncus, particularly J. canadensis, and many dicots such as Rhexia, Oxypolis, Phlox, Lycopus, Chelone, Eupatorium (particularly E. fistulosum, E. perfoliatum), Helenium, Helianthus.

While the soils this orchid grows in are permanently moist they are not often or for long periods flooded. Clearcutting of the hardwood overstory or of the oak-pine woodland of adjacent slopes results in more runoff from these uplands, this burying the bottoms of the small branches in silt. Clear cutting followed by mechanical site preparation exaggerates the problem still more. Thus logging in the vicinity of known populations would have the least damaging effect if it were selective or group-selective. Habitat is also lost when these small bottoms are pastured, the plants quickly disappearing as a result of trampling and grazing.

References:

- Correll, D.S. 1950. Native orchids of North America north of Mexico.
Luer, C.A. 1975. The native orchids of the United States and Canada.
The New York Botanical Garden.

SPECIES: Platanthera integrilabia (Correll) Luer

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X	X	X			*	X
Damage						X		
No Lasting Effect	X				X			
Beneficial if Done Properly								

Other Comments: * in that overplanting with trees would doubtless involve pine plantation the result would be negative.
 ** any drainage of the soil would have a negative result.

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.



→ Platanthera peramoena (Gray) Gray [E-J].

Habenaria peramoena A. Gray

Blephariglottis peramoena (Gray) Rydb.

Status: Threatened?

Technical Description:

Smooth, leafy-stemmed orchid to 1 meter tall.

Stems: erect, terete but with longitudinal ribs, pale green, the several internodes stiffish, mostly concealed by overlapping sheathes, at base to 6 mm thick.

Leaves: alternate-spiral, the lowest bladed ones usually largest, 2-5, with sheathes loosely tubular, fully 2 dm long, the blades narrowly elliptical or lanceolate, 10-20 cm long, spreading-ascending, acute, entire and papillose-margined, the bases acute and clasping, the upper surface deep dull green, the lower surface paler; blades gradually reduced in length and size on stem, becoming sessile, grading into peduncular and inflorescence bracts.

Inflorescence: Spike loosely to densely cylindrical, with up to 50 flowers, the lowest bracts to 3 cm long, lance-linear, grading gradually upward.

Flowers: a showy, bright rose-purple, the floral tube from ovary base to tip 2.5-3.0 cm long, narrowly wing-ribbed over the ovary, green with purple tints, the dorsal sepal broadly elliptic, 5-9 mm long, erect-based but arching forward apically, the lateral sepals asymmetrically broadly obovate, oblique at the truncated, erose apex, 6-9 mm long; upper petals broadly spatulate, 4-8 mm long, the suborbicular, entire apices shallowly cupped, arching upward and forward under and to either side of the dorsal sepal, the labellum 10-15 mm long, with a narrow base and 3 broadly obtriangular, strongly erose-and-truncated-tipped lobes, the laterals spreading at right angles and slightly shorter than the central, the central lobe apically with a narrow sinus; spur narrowly clavate-linear, 2.5-3.0 cm long, projecting backward parallelling the ovary; column viewed from side broadly obtriangular, ca. 3 mm high.

Fruit: capsule ellipsoidal, ca. 1.5 cm long.

Distribution and Flowering Season:

Moist grass-sedge meadows, ditchbanks, stream and river bottoms, various provinces, western New York south to western North Carolina, southwest to southern Missouri, eastern Arkansas, northern Mississippi and Alabama; flowering mostly in July and August.

Special Identifying Features:

This species is distinguished readily from other purple-fringed Platanthera of the southeast by its erose (shallowly notched-margined) rather than fimbriate (fringed) labellum.

Habitat and Management Implication:

P. peramoena appears to be ample in regard to substratum and light but requires constant soil moisture. Moist grass-sedge meadows

and open streambanks appear to be an optimum habitat in the northern parts of its range, although in the south the plants are commonly found in silty-sandy wooded creek and river bottoms, usually in fairly heavy shade. My own experiences with it have been in swampy woodland where the overstory is Nyssa, Liquidambar, Salix, Acer rubrum, bottomland oaks, Populus, Green Ash, Sycamore, with understory shrubs or small trees being Alnus, "Svida" dogwood, Itea, Ilex decidua, Sambus, etc. Ferns such as Osmunda, Athyrium, Thelypteris noveboracensis, Woodwardia areolata, Onoclea, Adiantum are common, along with shade grasses in genera Cinna, Bromus, Festuca, Chasmanthium, Panicum, Elymus, Agrostis in association with numerous carices, Scirpus, and lowland species in Laportea, Urtica, Pilea, Impatiens, Cryptotaenia, Cicuta, Thaspium, Phlox, Blephilia, Cacalia, Eupatorium, Rudbeckia, Verbesina. The orchid is usually scattered in small groups, tends to avoid the muckiest areas which have dense growths of Saururus, Polygonum, Ludwigia, Sagittaria, Commelina virginica, etc.

Danger to this orchid comes from draining of the wet meadows for conversion to improved pasture or to row crop agriculture as well as from clear-cutting of swamp woodland and creek bottoms which causes an abrupt upswing in rank woody and herbaceous growth. Many other creek bottom woodlands have been lost because of channelization of streams which tends to alter soil water conditions.

References:

- Correll, D.S. 1950. Native orchids of North America north of Mexico.
- Luer, C.A. 1975. The native orchids of the United States and Canada. New York Botanical Garden.

SPECIES: Platanthera peramoena (Gray) Gray

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy	NA	X	X	X				X
Damage						X		
No Lasting Effect								
Beneficial if Done Properly					X			

Other Comments:

Area should not be drained!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Southeastern Range of:
Platanthera peramoena (Gray) Gray



Leitneria floridana Chapm. [1-5]
Status: Threatened

Technical Description:

Small, strongly clonalizing, sparingly-branched, dioecious, deciduous tree, rarely to 7 meters tall, forming large but local populations of stick-like erect stems from a shallowly diffuse and spreading root system, the diameter of the trunk at base rarely to 12 or 13 cm, the bark pale brown, thin, longitudinally cracking and cross-checking to form long, narrowly rectangular tight plates.

Twigs: New shoots slender but stiffish, densely villous-tomentose, later in season becoming progressively smoother, often nearly smooth by fall, then dull gray-brown, with paler, strongly raised elliptical lenticels, teretish but decurrent-ridged below leaf scars, these semicircular, with lower edge strongly raised, the corky surface with 3 large bundle scars, the axillary buds triangular-ovoid, ca. 3-4 mm long, the scales several, tightly imbricate, dark chestnut brown, the outer ones nearly smooth, the inner pale pubescent toward tips, acute, slightly keeled; 2-year and older shoots becoming perfectly smooth, somewhat lustrous, deep purple-brown, the lenticels and leaf scars pale in contrast.

Leaves: Alternate in spiral, estipulate, spreading or ascending on teretish petioles ca. $1/5$ - $1/6$ the total leaf length, at first villous-tomentose, later nearly smooth; leaf blades mostly narrowly elliptic to lanceolate, (8-) 10-15 (-18) cm long, firm, acute, entire, slightly and narrowly revolute, the base cuneate to short-attenuate, pinnately veined, the upper surface yellow-green, paler when young and coated with a soft blonde or pale wooly tomentum, and impressed veiney, later with a persistent fine coat of appressed hairs, the lower surface paler, more densely tomentose, particularly on the strongly raised veins.

Inflorescence and Flowers: Most axillary buds expanding in early spring before leaves emerge to form short, strongly bracteate-scaley cone-like catkins. Male catkins oblong, narrowly ellipsoidal or lance-ovoid, mostly 2-3 (-6) cm long, of many, spirally imbricated chaffy bracts, all but the lowermost subtending a flower, these bracts 6-7 mm long, rigid, erectish, lanceolate, narrowly acute, the backs pale-lanate-tomentose, the inner surfaces smooth, dark red-brown; male florets without perianth, supposedly 3 per bract forming a cymule but appearing like a single flower with 3-12 stamens, these with yellowish, nearly round, bilocular anthers these basifixed on slender filaments about as long. Female plants with catkins narrower, fewer-flowered, the lowermost bracts sterile, broadly triangular-ovate, the backs nearly smooth, the fertile bracts similar to those of the male catkin in shape and pubescence, but each subtending a single flower, this subtended by a ring of a few gland-margined small scales; ovary superior, unicarpellate with 1 apical ovule, narrowed at base, the ellipsoidal or obovoid body sericeous-tomentose, shorter than the subtending primary bract, subapically bearing an elongate, excurved style projecting beyond the bract tip stigmatic along its inner side halfway to the style base.

Fruit: an ellipsoidal or narrowly obovoid drupe 1.8-2.0 cm long

and pale brown when ripe.

Distribution and Flowering Season:

Pond margins, wet swampy swales, swamp hardwood formations, palmetto-sawgrass marsh, in the Coastal Plain from eastern and south-central Texas, eastward sporadically along the coast (excluding Mississippi and Alabama) to Gulf Coastal Florida southward to the mouth of the Suwannee River; local in the Atlantic Coastal Plain (perhaps extirpated from the mouth of the Altamaha River in southeastern Georgia); in the Mississippi Embayment northward bypassing Louisiana but locally abundant and perhaps of its best development in the delta of Arkansas and southeastern Missouri.

Special Identifying Features:

Corkwood is the only member of the family Leitneriaceae, a family whose evolutionary position is yet debated. No other southeastern tree combines the sparsely branched, sticklike habit, simple, entire, stipulate leaves, dioecious habit, the strange styler character, and drupaceous fruit. The wood is unique in being the lightest of any southeastern tree and larger specimens were once cut into short lengths to be used for fishing net floats.

Habitat and Management Implication:

Leitneria appears in two rather different habitats. Along the Gulf coast, it is typically found in the narrow zone between sawgrass brackish marsh and contiguous coastal pine-hardwood-Cabbage Palm hammock. In such sites it has become quite rare, probably because in the past it was thinned by fishermen in quest of net floats. In the eastern counties of Arkansas and southern Missouri it is in fresh water marsh, usually along drainages (many now ditched) that traverse bottomland hardwoods. Common associates are Black Willow, Cottonwood, various bottomland oaks including Overcup, Willow, Water, Nuttall, Pin, Swamp Chestnut, Water Hickory, Green Ash, Swamp Red Maple, Drummond Maple, Box Elder, Catalpa, etc. In such bottomland formations it is usually occurring along the edges, not in the deep shade of mature stands, and it is always on high hydroperiod, silty clay substrates. Common shrub associates are in genera Cornus, Styrax, Salix, Sambucus, Cephalanthus, Ilex, Crataegus.

Along the seacoasts the species is threatened by commercial development, particularly as the recreational and fisheries facilities of the Gulf coast are expanded. Inland it is threatened by wholesale conversion of bottomland hardwood systems to cleared and drained fields of row crops such as soybeans, or irrigated fields of rice. Maintenance of this species would be easy, in that it is such a strong clonalizer, but it is not the most esthetically pleasing species, neither has it any significant economic use, thus the motives for its preservation are less. Logging operations in bottomland hardwoods contiguous to Leitneria would themselves pose no threat providing these were selective, involving no drainage and a minimum mechanical disturbance of the substratum.

References:

- Kurz, Herman & R.K. Godfrey. 1962. Trees of northern Florida.
University of Florida Press.
- Sargent, C.S. 1921. Trees of North America, ed. 2, facsimile
edition, Vol. 1. Dover Press.

SPECIES: Leitneria floridana Chapman

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy								
Damage No Lasting Effect	NA	NA	NA	NA			NA	
Beneficial if Done Properly					X	X		

Other Comments: Do not drain!

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Leitneria floridana Chapm.



245
SALICACEAE

100
Salix floridana Chap. Florida Willow
S. chapmanii Small?

Technical Description

Shrub or tree, in the former with several ascending trunks and a broad bushy crown; in the latter with 1 or few trunks from a single diffuse root, diameters of up to 40 cm, heights to 30 meters (fide R. K. Godfrey); bark grayish, braided in long, flat interlacing ridges, the furrows rather shallow, revealing a reddish-brown inner bark.

Twigs.-- Brittle, rather stiff, the new shoot growth greenish-brown, pilosulous; year-old shoots reddish or purplish-brown, sparsely pubescent with usually appressed hairs or glabrous; winter buds erect, lance-ovoid, greenish or reddish-brown, ca. 4 mm long, glabrous.

Leaves.-- Alternate, spirally arranged, deciduous, stipulate with stipules persisting on some shoots, variable in shape but usually broad, often reniform, bilobed, glandular-denticulate; leaf blades rather variable in shape and size, mostly (5.5-) 8-15 cm long, 2.5-5.0 cm broad, broadly lanceolate, ovate, elliptical, oblong or even obovate, rather firm, flat, bright yellow-green and smooth above, very glaucous beneath with the surfaces or at least the midrib and veins villosulous, apically acute, often mucronulate, the margin irregularly serrulate or serrulate-denticulate, each denticle with its tip producing a yellowish or reddish gland, the base rounded; largest leaves usually toward shoot apex, smallest but often broader outlined ones toward shoot base; petioles ascending or erect, greenish, smooth or finely pubescent, 0.5-1.5 cm long.

Inflorescence and Fruit.-- Plants unisexual, the linear and somewhat pendulous catkins produced at time of leaf emergence, the catkin axis villosulous with white hairs, densely so at pedicel nodes and there often also glandular, the pedicels spreading, slender, smooth, to ca. 2 mm long, the ovary developing into an ovoid, greenish, papillose capsule 3-4 mm long, this contracted rather abruptly to a beaklike apex bearing the persistent, short, bilobed style; capsule splitting at maturity from apex to base into 2 spreading valves revealing numerous, white-comose seeds.

Distribution and Flowering Season

Floodplain woods in scattered localities, Coastal Plain from central and southwestern Georgia southward into northwestern and northern peninsular Florida; flowering in March, fruiting in April.

Special Identifying Features

Some doubt must still exist as to the identity of this species. Dr. Chapman, who collected and described S. floridana from the Chipola River bottoms near Marianna, Florida, indicated that it has a shrubby habit, while Drs. Godfrey (pers. comm.) indicates that it can become a tree reaching 75 feet

and more than a foot in diameter. Specimens exhibit a perplexing gradation toward S. caroliniana Michx. (S. longipes Shuttlw.), a true species sharing the same habitat and often occurring with S. floridana. This last tends also to produce hairs on the lower surfaces of its mature leaves, has similar floral and fruit characters, ranges from a shrub to tree size, has similar twigs. However, it must be admitted that trees and shrubs answering to the original description and type of S. floridana are to be found today and Georgia and Florida. These exhibit a range toward a larger, broader leaf than shown by any other southeastern willow and have very white lower leaf surfaces which are quite hairy beneath even in maturity. In willow taxonomy this is an admission of a describable morphology, though the true rank and relationships of this entity would still seem open to various interpretation.

Habitat and Management Implications

S. floridana is an inhabitant of floodplain woodlands in calcareous districts where it is usually on the sandy-silty or limerocky banks of streams and rivers. As is true of most willows in the southeast, its seeds require a wet, sunny substrate for germination and its growth is intolerant of much shade. Thus, while the larger trees are often found in dense swamp forest, these are ultimately shaded out by longer-lived, more shade tolerant, or taller species and the younger specimens are usually found where sun may reach them such as in blowdowns or cleared areas, sunny banks or bars. Associate species may include Taxodium distichum, Sabal, Quercus hemisphaerica, Q. lyrata, Q. muhlenbergii, Q. michauxii, Carya aquatica, Ulmus, Celtis, Magnolia virginiana, Persea, Plantanus, Liquidambar, Nyssa, Forestiera, Fraxinus caroliniana, F. pensylvanica, Myrica, Cephalanthus, etc. The soil is a sandy silt, often inundated, usually at least moist. This particular willow, if seed stock from adjacent area is available, will move into disturbed areas along streams and therefore thinning of competing hardwoods would promote its increase.

References

- Chapman, A. W. 1883. Flora of the southern United States, pp. 452-454. Cambridge.
- Kurz, H. & R. K. Godfrey. 1962. Trees of northern Florida, pp. 27-32. Gainesville.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 412-415. Chapel Hill

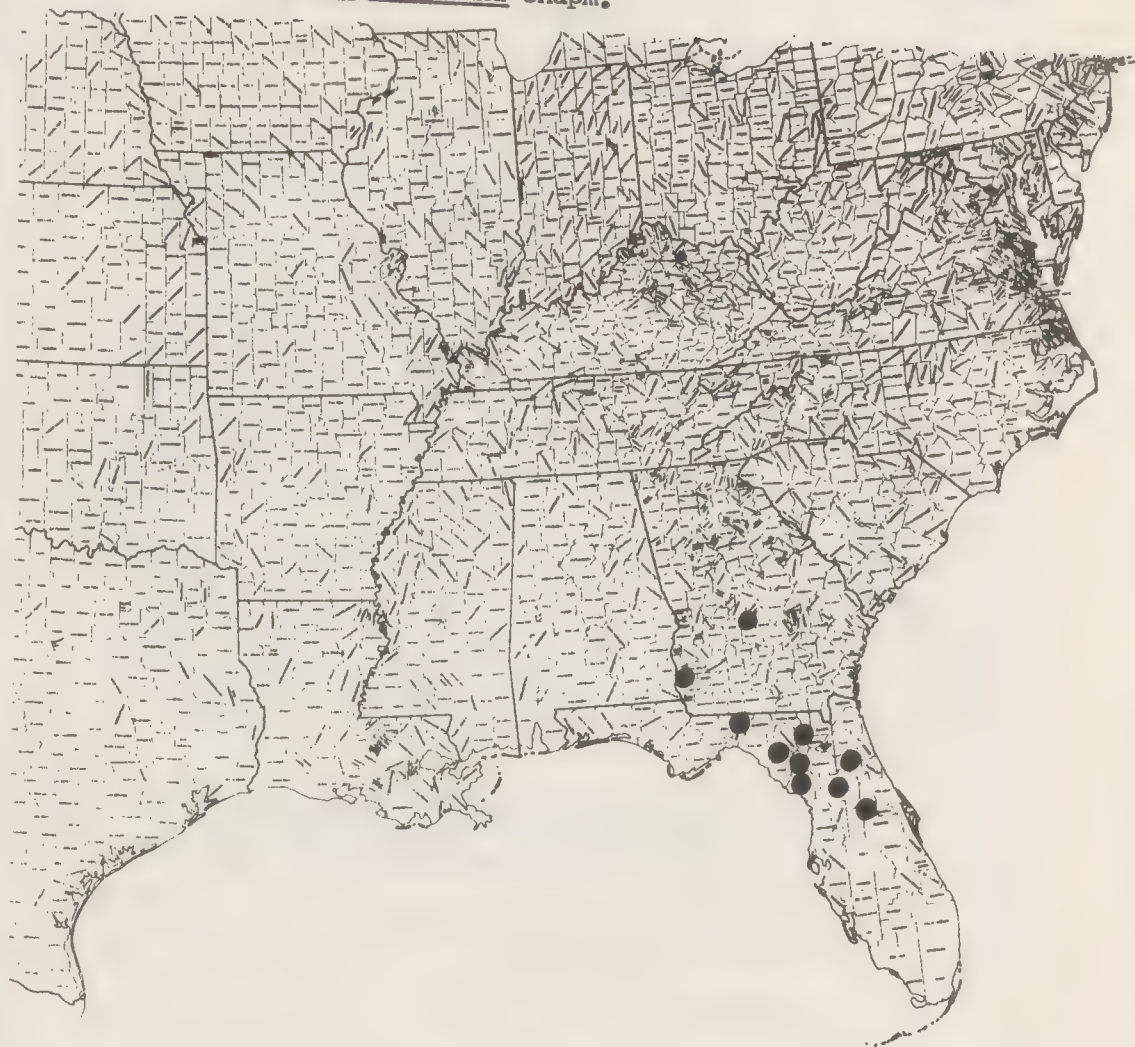
SPECIES Salix floridana Chapman. Florida willow

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	X	X	X			X	
Damage								X
No Lasting Effect								
Beneficial if Done Properly					X	X		

Other Comments: Drainage of site would destroy this species!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Salix floridana Chapm.



215 BETULACEAE!

100
Betula uber (Ashe) Fern. Virginia round-leaf birch.
B. lenta L. var. uber Ashe

Technical Description

Tree to ca. 30 feet tall and 12" d.b.h., the growth pleasingly aromatic, smelling of wintergreen the trunk erect to ascending, the bark dark reddish-brown, this, shallowly furrowed, cross-checking, forming thin, appressed scales, the branching profuse, spreading, pendulous toward tips, forming a roundish crown.

Twigs.-- Slender, zig-zag, dark red-brown or paler, with pale, somewhat raised lenticles, smooth; winter buds ovoid or lance-ovoid, acute, ca. 5-7 mm long, the numerous scales imbricate, the rounded backs reddish-brown, ciliate, somewhat resinous; spur shoots abundantly produced.

Leaves.-- Deciduous, alternate, stipulate, the stipules deciduous early, the petioles spreading, slender, 8-10 mm long, adaxially pilose, particularly near junction with blade; blades membranaceous, broadly ovate to suborbicular, 1.5-3.0 (-3.5) cm long, 1.5-2.5 cm wide, rounded, the margin serrate-dentate, the tooth tips sharp, the venation ascending-pinnate, with 4-5 pairs of laterals, the upper surface glabrous, dark green the lower surface appressed-pilose along the midrib and toward the base of larger lateral veins.

Inflorescence.-- Flowers unisexual, male and female catkins produced on same tree, the former preformed the previous year, narrowly cylindrical, elongating and drooping at anthesis, fully 8-10 cm long, the bracts reddish-brown essentially as in *B. lenta*, the female catkins mostly erect, single and terminal on the spur and short shoots of a season in late spring, ripening during summer and persisting through the season, ovoid-cylindric, 1.4-1.8 cm long.

Flowers.-- Male flowers not seen; female flowers "naked", 2-styled in axils of numerous, imbricated, 3-lobed bracts, these with lobes subequal, broadened distally, the central one erect, the laterals bowed outward, all raised abaxially, veiny distally, the venation impressed adaxially along median and all somewhat glutinous.

Fruit.-- Akene ca. 2 mm long, 1.8-2.0 mm wide, the body elliptic or obovate, winged, the thin wing narrow toward the base, broadening distally and there 0.5 mm wide.

Distribution and Flowering Time

Gravelly banks and bottoms of Cressy Creek, at elevation of ca. 3800 ft., Blue Ridge, Western Virginia; flowering in late spring, fruit maturing in June and persisting through summer.

Special Identifying Features

This rare tree is in all ways similar to Black Birch except in its rounder, smaller, leaf blades which have less pairs of lateral veins, and in its more

pilose petioles. It does not really appear to act as a species and research is now being conducted to determine its true biological status. Its seed germination is poor, only about 1%. In an experiment where 300 seedlings were finally gotten only 3 were true to type, the rest exhibiting characters of B. lenta. However, of numerous attempts to graft stock, only two have succeeded thus far (Dr. Sharik, 1979).

Habitat and Management Implications

The round-leaved birch, as mentioned above, is known from only one locality. This is the rocky, gravelly bottom of Cressy Creek, a shallow, swift mountain stream south of Marion. The trees are genuinely rare with less than 50 plants known from the area, most of these seedlings, and most of the specimens on private land, only 14 large enough to produce fruit. Of these "mature" specimens only one is on Forest Service land. Betula lenta is abundant in the same area. Associate species of trees on the gravelly or sandy alluvium of the creek bottom include Acer saccharum, A. rubrum, Quercus rubra, Prunus serotina, P. americana, Platanus occidentalis, Robinia pseudoacacia, Fraxinus pensylvanica, with Ostrya virginiana, Carpinus caroliniana, Cornus florida, C. amomum, Alnus serrulata, Amelanchier laevis, Crataegus flabellata, C. crusgalli, Malus coronaria in the understory. Tsuga canadensis, Pinus strobus, P. echinata, and P. virginiana are scattered throughout or form small stands. Much of the bottom floods and much of the area along Cressy Creek has been cleared for pasture or is pastured woodland. The forest generally shows a history of logging and probably had been logged over by the time W.W. Ashe found the trees there in 1914. The birch appears to occupy (as does B. lenta) a disclimax role in forest succession. At present, in spite of (and perhaps because of) considerable effort on the part of conservationists, etc., communication is poor between the Government and the private land owners in the area, to the point where continued survival of the less than 50 individuals is uncertain. There has already been considerable abuse of the plants, not only by locals but also by professional people who should have known better. The single large tree that is on U.S. Forest land is now well protected by high wire fencing although (and this seems strange!) the site is marked by a roadside sign.

The future of the tree in cultivation appears to be assured, in that many cuttings have been rooted or will be rooted. But the future of this doubtful taxon in nature remains questionable.

References

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- Fernald, M.L. 1945. Notes on Betula in eastern North America, *Rhodora* 47: 325-326.
- Johnson, A.G. 1954. Betula lenta var. uber Ashe. *Rhodora* 56: 129-131.
- Ogle, D.W. and P.M. Mazzeo. 1976. Betula uber, the Virginia round leaf birch, rediscovered in southwestern Virginia, *Castanea* 41: 248-256.
- Reed, C.F. 1975. Betula uber (Ashe) Fernald rediscovered in Virginia. *Phytologia* 32 (4): 305-311.

Sharik, T. 1979. The endangered Virginia round-leaf birch (Betula Uber (Ashe) Fernald): an example of the challenges in the management of rare and local tree populations. Paper presented in the Conference at V.P.I. "Dendrology in the Eastern Deciduous Forest Biome", 11 September 1979, Blacksburg, Virginia.

SPECIES Betula uber (Ashe) Fernald. Virginia round-leaf birch

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	NA	NA			X	
Damage	X					X		X
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Betula uber (Ashe) Fern.



445
FAGACEAE;→ Castanea ozarkensis W. W. Ashe ^{11-91.} Ozark chinquapinC. arkansana, AsheC. ozarkensis var. arkansana (Ashe) Ashe

Technical Description

A tree at times reaching 20 m, now usually much lower and often shrubby.
Stems.--The trunk sometimes short, quickly branching (when in forest) with a straight, clear pole, the bark gray brown on older trees of rather long, flat (but scaly), thickish ridges separated by rather broad fissures, the crown full and roundish. First-year twigs somewhat zig-zag, smooth, slender, but stiffish, terete, the bark reddish-brown or grayish with pale, small raised lenticels, the winter buds ovoid, ca. 4 mm long, mostly with 2-3 visible bud-scales, the outer dark brown, smooth, the inner with some pale appressed pubescence.

Leaves.--Deciduous, alternate, subtended by early deciduous, narrowly linear-triangular stipules, the petioles ascending, smoothish, 1 cm long or less, the blades mostly narrowly obovate, oblong or elliptic, mostly 10-20 cm long, firm, short to long-acuminate, saliently or ascending toothed, the teeth usually slender-acuminate and ascending, the base rounded or broadly attenuate, the upper surface dark lustrous green, smooth, the lower surface matted with close, yellowish, stellate tomentum and strongly pinnately veined, each vein extending straight to a tooth-tip.

Inflorescence.--Flowers unisexual, small, both sexes in the same catkin, with female below, or some catkins exclusively male, the catkins elongate, soft, evil-smelling, linear, 10-20 cm long, not 1 cm broad. Male flowers in close or interrupted clusters along the tomentose catkin axis and in axils of ovate, hairy scales.

Flowers.--Calyx 6-parted, small; stamens 10-20, with filaments very slender and anthers versatile, nearly round. Female flowers sessile toward base of some catkins, singly or in 2's or 3's, each ovoid, with a pubescent involucre of closely overlapping scales, the 6 stout-linear, smoothish-style branches projecting beyond.

Fruit.--Involucre expanding to form a roundish tomentose bur, this with branched-spiny projections, the spine branches smooth and sharp at the tips, pubescent below, the whole bur fully 3 cm across, the thickish valves 2-4, splitting to reveal a single, dull brown, ovoid nut nearly 2 cm long.

Distribution and Flowering Season

Dryish uplands and ravine slopes, in the Interior Highlands of Missouri and Arkansas. Flowering mostly in June.

Habitat and Management Implications

This species is somewhat the ecological equivalent of C. dentata, being a tree

of uplands, usually developing on acidic, sandy soils. In the overstory, its associates are upland oaks (Quercus velutina, Q. stellata, Q. marilandica, Q. coccinea, Q. prinus [montana], Q. alba), upland hickory (Carya tomentosa, C. texana, C. ovata), Ulmus alata, Nyssa sylvatica. In the understory are Cornus florida, various Vaccinium.

While the greatest impact of the chestnut blight (Endothia parasitica) has been on C. dentata, once an important timber tree, it has been but slightly less severe on the other Castanea, so that these also are being destroyed. Large specimens of any Castanea, including C. ozarkensis are becoming a rarity. Increasingly, often the only specimens obtainable are from the stump sprouts from diseased trees.

Suggested Reading

Ashe, W. W. 1923. Notes on trees and shrubs. Bull. Torr. Bot. Club 50:360-361.

Steyermark, Julian A. 1963. Flora of Missouri, pp. 530-531.

Revised March 1980

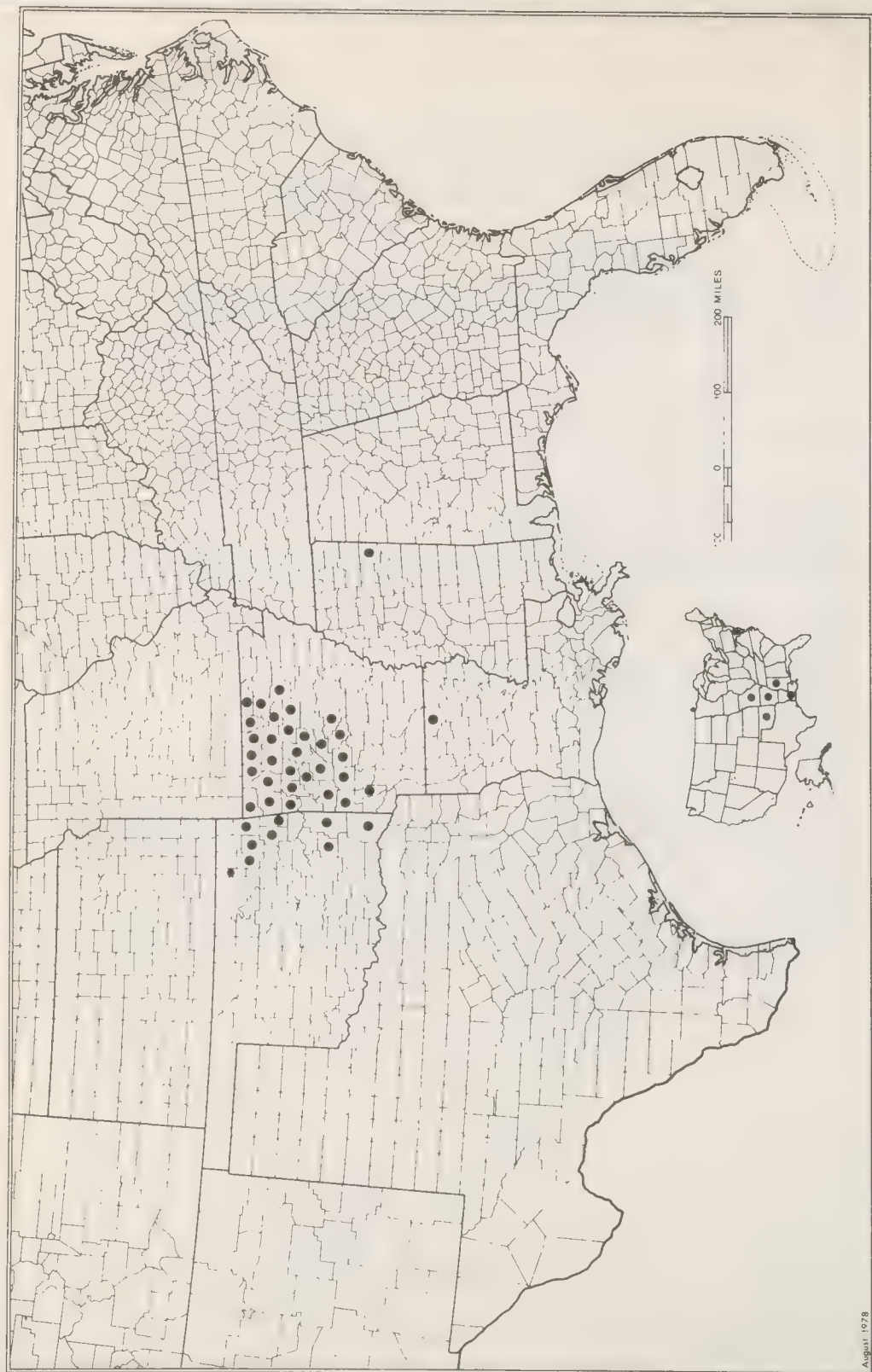
SPECIES: #58 Castanea ozarkensis W. W. Ashe; Ozark chinquapin

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy		X	X	X				
Damage	X							
No lasting effect								
Beneficial if done properly					X	X		

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980



MAP 58. *CASTANEA OZARKENSIS*

August 1978

245
FAGACEAE;

100

> Quercus arkansana Sargent [I-4].

Q. caput-rivuli Ashe

Status: Threatened

Technical Description:

A small to medium-sized deciduous tree in drier sites low and of twisted form, on better sites often a clean straight tree to 20 meters or more tall and with a diameter to 6 dm, the lower bark dark, moderately thick, blocky, grading quickly above to long, tight, narrow rectangles and long, shallow, longitudinal cracks much as in Water Oak.

Twigs: Shoots of a season slender, stiffish, reddish-brown with a scattering of small, stellate hairs and a relief of pale raised lenticels, the terminal buds lance-ovoid, ca. 3-4 mm long, acute, the imbricated bud scales ovate, not angled, the margins ciliate, the backs pale reddish-brown and smoothish. Older shoots becoming glabrous, grayish or grayish-brown.

Leaves: alternate in a spiral, somewhat spreading, short-(1 cm or less) petioled, the blades mostly obovate, similar in outline to Blackjack Oak (Q. marilandica) but mostly thinner, exclusive of those of suckers or stump sprouts 5-10 cm long, sometimes apically with 3-5 low rounded lobes, these each with an excurrent prickle, sometimes lobeless and broadly rounded, or obtuse or truncate, the margin below the broad apex always entire, the base either cuneate or narrowly rounded, the upper surface a rich, dark yellow-green, the major veins strongly impressed and, when young, stellate-hairy, the lower surface paler, the main veins strongly raised, cottony lanose in the axils, otherwise with a scattering of stellate pale reddish-brown hairs (these often not persisting to fall).

Fruit: Ripening in 2 years, 1-2 per peduncle, the peduncles short, stout; acorn cup shallow, less than 1/3 of the nut height in length, 1.2-1.5 cm across, the numerous tightly imbricated scales narrowly triangular, the narrowed tips truncate, the margins narrow, reddish-brown, the backs velutinous with very small, appressed gray hairs; nut dull brown, sometimes striped, nearly round, about 1 cm long, minutely puberulent.

Distribution and Flowering Time:

Sandy or sandy clay uplands or upper ravine slopes, Coastal Plain, the southern counties of Arkansas and scattered localities eastward in Alabama, southern Georgia, and northwestern Florida; flowering in late March and April.

Special Identifying Features:

This tree, in the opinion of Trelease, may have arisen as a hybrid between Q. marilandica and Q. nigra. This is a reasonable assumption although other putative parental species might as well be Q. laurifolia or one of the lobed-leaved smoothish southern red oaks. However, one can make a good picture of this taxon by considering it as having leaves of the outline and approximate size of Q. marilandica, with the slender twigs and smallish, rather smooth buds of one of the willow oaks.

Habitat and Management Implication:

Q. arkansana is a rare component of oak-hickory-yellow pine uplands where, if the substrate is high in clay, it achieves its largest known size. In Arkansas the associated pine are *P. taeda*, *P. echinata*, with associated hardwoods including *Carya texana*, *C. tomentosa*, *Quercus falcata*, *Q. velutina*, *Q. alba*, *Q. nigra*, *Q. phellos*, *Ulmus alata*, *Fraxinus americana*, *Acer rubrum*, *Nyssa sylvatica*, with *Cornus florida*, *Cercis*, *Bumelia*, *Vaccinium arboreum*, *Sassafras*, *Prunus mexicana* in the understory. In the eastern localities it appears in the Longleaf Pine-deciduous scrub oak type, usually in the ravine heads and slopes of higher ridges, and is rooted in coarser sands. In such sites it is often in the understory and is a poorer, scrubbier tree that rarely exceeds 15 meters and has such associates as *Pinus palustris*, *Quercus laevis*, *Q. incana*, *Q. margaretta*, *Q. velutina*, *Carya pallida*, *C. tomentosa*, occasional southern Sugar Maple (on slightly lower places), *Osmanthus*, *Cornus florida*, *Cercis*, *Symplocos*, *Vaccinium*.

The greatest threat to this species of oak comes from a conversion of the oak-hickory-pine uplands to plantation pine, this generally involving a poisoning of the poorer hardwoods, a salvage cutting of residual pines and better hardwoods, mechanical site preparation that usually involves root raking or bulldozing and total obliteration of the oak habitat. So far as is known, there are no populations of this rare oak known from public lands, thus it is important that existing habitat for it be identified and preserved where possible. *Q. arkansana* rarely reaches merchantable size, thus is mainly overlooked by loggers. On the other hand it appears not to be a weedy species. Its small niche could be maintained at little if any loss to the upland woodlot manager.

References:

- Sargent, C. S. 1921. Trees of North America, ed. 2, facsimile Dover edition, Vol. 1.
- Kurz, Herman, & R. K. Godfrey. 1962. Trees of northern Florida. University of Florida Press.

SPECIES: QUERCUS. arkansana Sargent

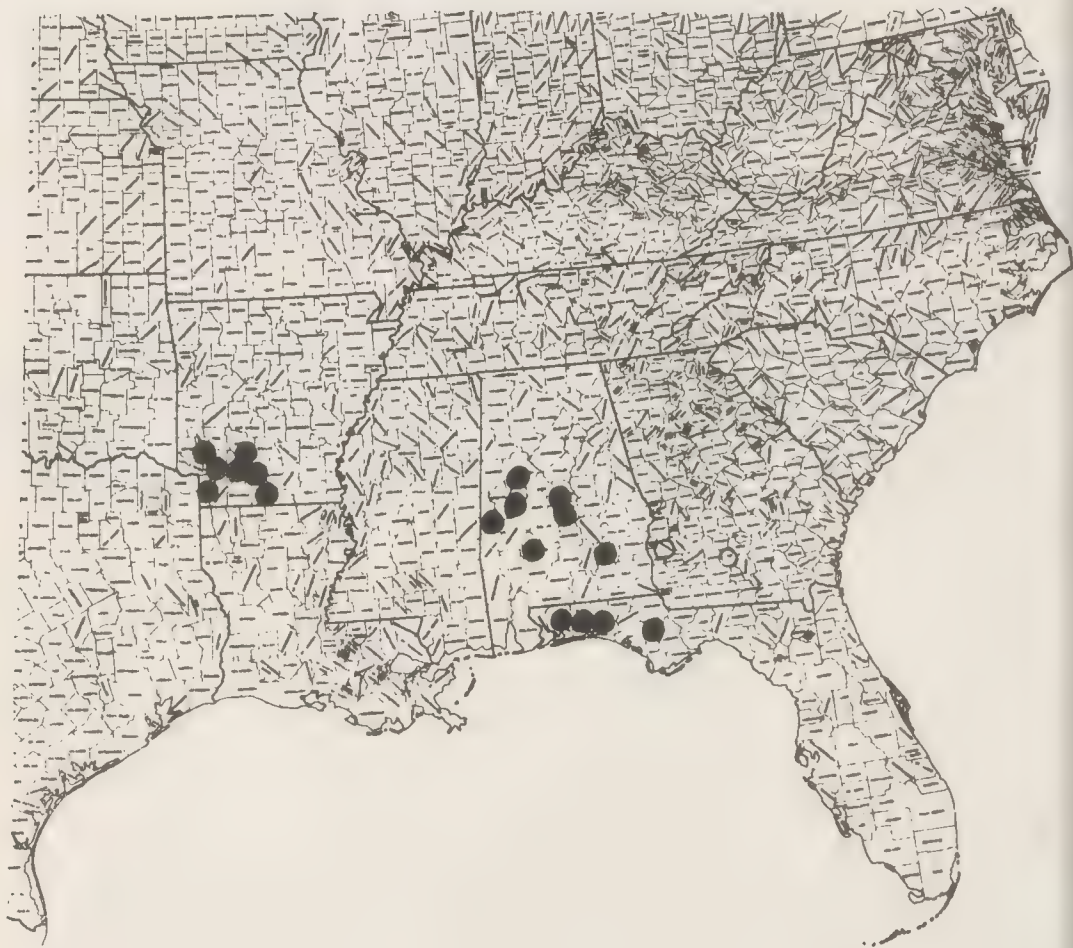
Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X				
Damage No Lasting Effect	X		NA					X
Beneficial if Done Properly					X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:

Quercus arkansana Sargent



245
FABACEAE:)> Quercus georgiana M. A. Curtis, ^{E.J.} Georgia Oak or Stone
Mountain Oak

Technical Description

Tall shrub or small tree, rarely to 12 meters tall.

Stems.--The trunks 1 or several, with diameter rarely reaching 20 cm, the bark gray-brown, smoothish, in age developing shallow longitudinal cracks and cross broken into thin plates, the branches spreading, smoothish. Twigs slender but stiffish, smooth, reddish-brown, the winter buds with larger terminals lance-ovoid, ca. 4 mm long, round in cross-section, narrowly acute, the scales lustrous reddish-brown, smooth save for low-ciliate margins.

Leaves.--Obovate to oblanceolate or elliptic, the blades 5-10 (-15) cm long on smoothish petioles 5-10 mm. long, mostly 3-5-lobed, the lateral lobes spreading-ascending, oblong or triangular, prickly-tipped, and themselves otherwise entire or with 1-few low, prickly-tipped teeth, the sinuses broad and rather shallow, the terminal lobe usually broadest and longest, simple or low-toothed apically, the base cuneate, the upper surface dark yellow-green, lustrous, the lower surface paler, smooth save for tufts of dully yellow cottony hairs in the vein axils.

Fruit.--Ripening in 2 years, sessile on short, stiffish spreading peduncles; acorn nearly 1 cm long, broadly ovoid to round, dull brown and faintly striped; acorn cup shallowly turbinate, covering the nut about 1/2 its length or less, 7-8 mm high, 12-13 mm broad, 10-11 mm across the apex, the scales small, tightly appressed, narrow the pale reddish-brown, sparsely short-hairy and ciliate, the tips truncated, those of the rim with tips erect.

Distribution and Flowering Season

On and around granite outcrops, primarily in the Piedmont, from South Carolina across Georgia into east-central Alabama.

Habitat and Management Implication

This rather rare tree is a prolific mast producer similar in that respect to Q. ilicifolia. In bark and twig, particularly bud, it is like Q. phellos or Q. palustris; in leaf it is like shallow-lobed extremes of Q. palustris (which has broad, rather than cuneate leaf bases!). It may be abundant locally within its rather small range. If not actually found on granite outcrops it will be on sandy soils close to them, usually in association with other oaks such as Q. margaretta (mostly the low, running variety), Q. stellata, Q. velutina, Q. marilandica, Q. falcata, Q. prinus, etc., upland hickories, sourwood, sassafras, with an understory mostly of heaths such as Vaccinium, Kalmia, Rhododendron (primarily R. canescens or other deciduous rhododendrons). Pines may also be in the overstory or even dominating, these mainly P. echinata, P. palustris, P. taeda.

The sites this oak occupies are usually of a poor quality. Cutting of suitable pine and hardwood would tend to increase this species. All oaks, including this one, sprout prolifically from the stump on cutting or burning. Thus it would increase as a result of clear-cutting, or fire. However, the rocky sites and thin soils occupied by this species are not favorable to such practice, nor are they favorable to most site preparation methods, including controlled burning.

References

- Radford A. E. et al. 1968. Manual of the vascular flora of the Carolinas, pp. 372-385. Chapel Hill, N.C.
- Sargent, C. S. 1949. Manual of the trees of North America, Vol. I, pp. 249-250. Dover Press.

SPECIES: #78 Quercus georgiana M. A. Curtis Georgia oak or Stone Mountain

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage								X
No Lasting Effect	NA						NA	
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Quercus georgiana M.A. Curtis



245
FAGACEAE

100
11-21
Quercus oglethorpensis Duncan, ~~Oglethorpe Oak~~

Technical Description

A medium-sized to large tree (to 25 meters tall).

Stems.--The bark on older trunks platey, gray (as in Durand Oak, White Oak, etc.) New shoots with scattering of stalked stellate hairs, later becoming smooth or nearly so, somewhat lustrous, reddish-brown. Winter buds with terminals about 3 mm long, ovoid, bluntish, dull reddish-brown, the inner scales conspicuously low-ciliate.

Leaves.--Spreading on smoothish, short petioles (3-8 mm. long), deciduous, the blades from oblong to narrowly elliptic or oblanceolate, mostly 5-10 cm long, (similar to willow-leaved oaks), the tips prickle-less, rounded to obtuse-angled, the margins entire or rarely with a few low, sinuate lobes, slightly emarginate, the bases acute or cuneate, the upper surface yellow-green, somewhat lustrous, the lower surface more yellowish, sparsely to densely covered with short-stalked, stellate and tan hairs.

Fruit.--Acorn about 1 cm long, nearly sessile, maturing in 1 year, the cup 1/2 or less as long as the nut, thinnish, turbinate, about 1 cm broad, the numerous narrow cup scales tightly appressed, dull reddish-brown, tomentose with short weak hairs toward their bases, thinner, paler and less hairy toward their narrow but blunt tips, those of the margin erect, the rim of the cup not fringed: nut round or ellipsoidal, dull brown or tan, with a scattering of appressed, weak hairs over the shell.

Distribution and Flowering Season

Poorly drained bottoms and adjacent slopes, in the Piedmont from western South Carolina south into eastern Georgia.

Special Identifying Features

This oak is taxonomically closest to the Durand Oak, differing from it only in slight ways, such as in the darker colored leaf hairs, the slightly smaller fruit, and perhaps should be considered a mere variant of that species, particularly if ones concept of Durand Oak includes Q. austrina.

Habitats and Management Implication

It is found in poorly drained alluvial sites, mixed with other bottomland species of oaks, particularly the willow oaks, and various species of ash, elm, hickory.

Management should be as for other bottomland oaks, but owing to the scarcity of the species, every effort should be made to preserve the specimens. No observations as to its silvicultural characteristics are available to this reporter.

References

- Duncan, W. H. 1940. A new species of oak from Georgia. *Am. Midl. Nat.* 24: 755-756.
- Radford, A. E. et al. 1968. *Manual of the vascular flora of the Carolinas*, pp. 372-385. Chapel Hill, N.C.

SPECIES: #36 Quercus oglethorpensis Duncan. Oglethorpe oak

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage								
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

No doubt behaves as do others of the bottomland white oaks and would be managed accordingly, but with particular attention to reproduction in that this tree appears to be quite scarce! Now reported from IA.

Quercus ogelthorpensis Duncan



Paper 79

Text & map by:

Robert Kral

215
FAGACEAE

1 species

Quercus shumardii Buckley var. acerifolia Palmer ^{E-41} Oak;
~~maple leaf Shumard's oak~~

Technical Description

In bark and habit comparable to Q. shumardii.

Stems.--Twigs slender but stiffish, grayish-brown, smooth; winter buds narrowly ovoid, 4-5 mm. long, acute, the scales dull gray-red-brown, smooth with very thin, broad margins.

Leaves.--On slender, spreading, smooth petioles 3-4 cm long, the blades broadly ovate to round or even reniform, in the central form mainly with 5 principal lobes, these spreading palmately as in some hard maples, but the venation truly pinnate, the lobes mostly narrowly or broadly cuneate or obovate, basally entire, toothed or shallowly triangularly lobed apically, all teeth and lobes prickletipped, the sinuses between the main lobes deep, tending to be closed, the blade base obliquely truncate or cordate, the upper surface dark green, lustrous, the lower surface paler, with tufts of pale cottony hairs in the vein axils. Fruit as in Q. shumardii, nearly sessile, 2-3 cm long, the cup shallow, 1.5-2.0 cm across, covering less than 1/3 of the nut, the numerous small ovate scales tightly appressed, round-tipped, the backs dull gray-brown with a close covering of small, weak, flattish hairs, the margins broad, thin, brown, smooth, ciliate.

Fruit.--Acorn ovoid, ellipsoidal, or nearly round, pale gray-brown with a dusting of flat, pale, stellate or simple hairs.

Distribution and Flowering Season

This tree, thus far, has been found only on Magazine Mountain, Logan County, Arkansas. This puts it in the Ouachita system. The specimens are medium sized, are toward the rocky rim, at elevations of about 2500 ft., and are mixed with a variety of upland oaks and hickories. The only known locality is in the Ozark National Forest.

Special Identifying Features

While this is but a variety, and probably has silvical character comparable to that of the rest of the species, it is so unusual as to bear preservation and, hopefully, propagation as well. As the name and description indicate, the leaves are suprisingly maple-like, in size and outline very comparable to Acer grandidentatum.

Reference

Palmer, E. J. 1927. Journ. Arnold Arb. 8:54.

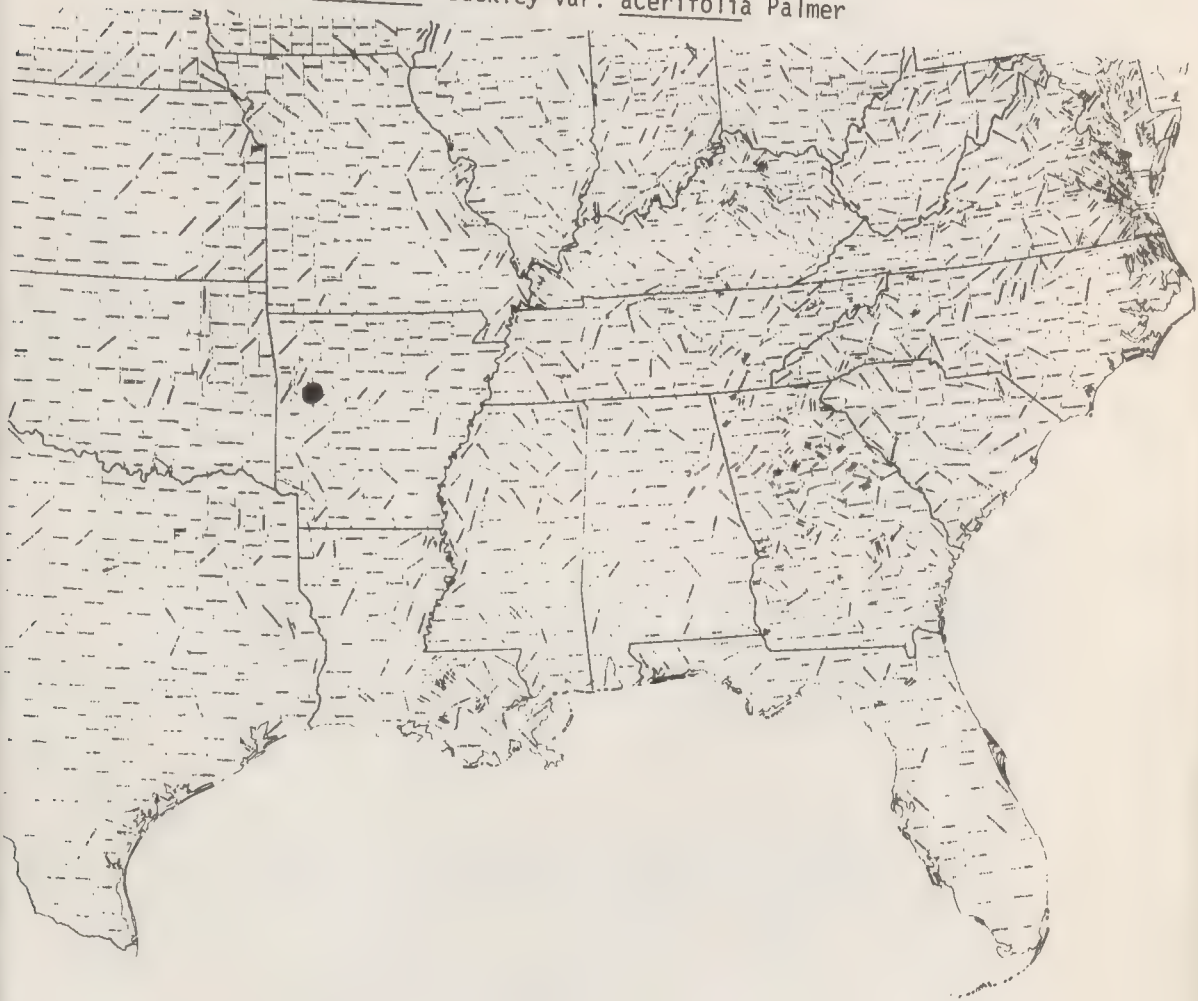
SPECIES: #79 Quercus shumardii Buckley var. acrifolia Palmer; oak

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage								X
No Lasting Effect	NA						NA	
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Quercus shumardii Buckley var. acerifolia Palmer



245
SANTALACEAE→ Nestronia umbellula Raf. ~~Common nestronia~~

Technical Description

Strongly clonal, deciduous, smooth, dioecious shrubs mostly 3-10 dm tall, parasitic on roots of hardwoods or pines.

Shoots.--Primary shoots mostly stiffly erect, broad-crowned, terete, smooth, reddish-brown, the bark of older wood thin with a thin, pale, anastomosing exfoliating cuticle, the branching opposite, the new shoot growth greenish; winter buds triangular, imbricate-scaly, the scale backs reddish-brown, smooth.

Leaves.--Opposite, subdistichous, simple, estipulate, spreading or ascending on short (2-3 mm) petioles, the blades mostly elliptic, oblong, lanceolate or broadly ovate, 2-6 cm long, acute, entire with narrow pale granular margins, the bases cuneate to short-attenuate, the upper surface dark dull yellow-green, the lower surface markedly paler.

Inflorescence.--Male plants with simple umbels produced on slender, erect or ascending, supra-axillary, bractless peduncles 1-2 cm long, the (mostly) 3-6 flowers spreading on very slender pedicels 2-4 mm long; female plants with larger flowers, these solitary, axillary, on stouter peduncles 5-7 mm long, and terminating in a joint, around the rim of which are 1-several, peg-like, reddish-tipped appendages (bracts?), and to which the hypanthium is jointed.

Flowers.--Regular; male flowers yellow-green, with the slender pedicels dilating apically and merging imperceptibly with the funnelliform hypanthium; calyx lobes (3-) 4, triangular, 2.0-2.5 mm long, spreading-recurved, acute, the margins papillate, particularly distally; petals none; stamens 4, erect, ca. 1.5-2.0 mm long, opposite the sepals and projecting the anthers slightly above the calyx orifice, the filaments ca. 2 mm long, arising from the hypanthial rim just below the sepal sinus, their dilated bases tucked under the thin hypanthial edge, the dorsifixed anthers broadly ellipsoidal, ca. 0.6 mm long, the connective appendaged with several very long, flattened, pale, reflexed trichomes that connect with opposing sepals. Female flowers with hypanthium narrowly obconic, mostly 6-7 mm long, maroon, the spreading-recurved sepal lobes fleshier than in the male, ca. 3 mm long; stamens present, 4, erect, the anthers non-functional; ovary inferior, the single style stout-linear, erect, ca. 2 mm long, terminating in a 3-4 lobed stigma.

Fruit.--Drupaceous, obovoid, ca. 1 cm long, the 4 sepal lobes erect, persistent on the truncated summit.

Distribution and Flowering Season

Sandy, usually open woodlands, Piedmont and Coastal Plain, scattered from eastern Virginia southward to Georgia and Alabama; flowering in April and May.

Special Identifying Features

Nestronia is monotypic, different from other shrubby Santalaceae by the umbellate male florets (sharing this only with Buckleya), and the unique trichomal webbing between anthers and sepal bases. In Buckleya, a much taller shrub, the male inflorescence is terminal rather than axillary.

Habitat and Management Implications

N. umbellula is very local, but produces large clones, usually in deep, moist to quite dry sands, sandy loams or sandy clays. Oddly, most clones, if in proximity are all of one sex or the other, with the female much more rare, often producing few flowers. The overstory varies. Some stands are found in sandhills ecotones to shrub bog, and are under various species of yellow pine, upland oaks and hickories, with abundant ericaceous shrub associates. Still other clones are found in open upland stands of oak-pine-hickory, others under mixed upland hardwoods. Some authors indicate that the plants parasitize pines exclusively, whilst others comment that the hosts are exclusively hardwoods. A study is currently being run on this. However it can be concluded that the habitat is usually open woodland, rather dry, usually sandy, and that the substrate is typically quite acid.

In that the plants are root parasitic it follows that removal of the hosts through logging or clearing removes the parasite. Also, in that most of the forest types these shrubs are found in are fire disclimax or have fire in their history, it may be concluded that periodic woods fires have no adverse effect, so long as the hosts are not killed.

References

- Radford, A. E., C. R. Bell and H. E. Ahles. 1968. Manual of the vascular flora of the Carolinas, pp. 396-397. Chapel Hill, N.C.
- Rafinesque, C. S. 1836. New flora of North America 3, New Sylva, p. 12. Philadelphia, Pa.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 1248-1249. Chapel Hill, N. C.

Note--Nestronia has been found recently (spring, 1982) in the oak barrens of middle Tennessee by Mr. Dennis D. Horn of Tullahoma. This Coffee County record is the only known report for Tennessee.

SPECIES Nestronia umbellula Raf. common nestronia

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X				
Damage						X*		X*
No Lasting Effect	X				X			
Beneficial if Done Properly								

Other Comments: if cutting means removal of host root system, then plants would be destroyed; family is poisonous to stock, but plants could be damaged by trampling.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Nestronia umbellula Rafinesque



245
ARISTOLOCHIACEAE;

→ Hexastylis contracta Blomquist [1-4].

Status: Threatened

Technical Description:

Perennial, evergreen, ginger-smelling Heartleaf, increasing by short, ascending, branching rhizomes, these with fascicles of fleshy, linear roots and with strongly raised leaf scars, the branches all floriferous, numerous enough on older plants to form densely leafy low domes of leaves.

Leaves: alternate, of 2 sorts; scale leaves thin, nearly round but sharply folded, venose, tan, viewed from side semicircular, falciform, to 1 cm long, the hinge straight or curved, the margins entire but often villose, enfolding the floral stalk base; foliage leaves of previous season persisting often beyond current season's flowers, new ones developing above scale leaves on fresh growth, erect or spreading on slender, elongate, clasping-based petioles 6-15 cm long, pale green or suffused with red pigments, the upper side grooved, all sides smooth or distally scabro-puberulent, the blades suborbicular to reniform or very broadly ovate, 4-7 cm long, leathery, apically narrowly rounded, broadly rounded, obtuseangled, rarely emarginate, the margins entire, narrowly inrolled, thus there thickened, the bases cordate-auriculate, the broadly rounded auricles overlapping or presenting an acute or oblong outline sinus, smooth, the upper surface lustrous deep green, impressed veiney, rarely paler along the main veins, the lower surface somewhat paler, slightly raised-veiney and quite pale along the main veins, sometimes also with suffusions of red pigment generally.

Flowers: solitary from axillae of scale leaves, but usually 2 or 3 per short rhizomal branch, thus often quite numerous on older plants and forming a compact clump of blooms, the slender, terete peduncles erect or ascending, 0.5-2.5 cm long, accrescent, usually hidden by scale leaves at early anthesis, much elongate by late anthesis or fruit, pale but often with much red or purple pigment distally; perianth comprised of sepals only, fleshy; sepals 3, mostly 1.5-2.5 cm long, united to form a flask-shaped tube, this narrowed at base, flaring at about the lower 1/3 to form a low, rounded flange, then narrowing slightly to the rim, here with the lobes broadly triangular, spreading, 5-7 mm long, the apex obtuse-angled, the sides rounded; external surface of perianth tube flesh-toned or pale green or pale lavender with dark, parallel nerves, these branching and anastomosing in the lobes; internal surface with lower 1/3 of tube raised-purple-reticulate, the ridges low, above this with upper tube smooth and ridgeless, the lobes sparsely villose-puberulent with some hairs having swollen purplish-pigmented bases, some patches of cells red-pigmented, forming a scrobiculate and patch pattern of red or maroon; stamens 12 in 2 close cycles, united and arising on short, fleshy filaments from near ovary apex, the erect anthers oblong, ca. 3 mm long, with a short apiculus; ovulary 6-carpellate, inferior, producing apically a rim or ring of 6, erect, hornlike, fleshy styles and their extensions, these extensions narrowing to a blunt tip of 2 connivent lobes 1/2 as long as the extension, thence grooved externally down to the

roundish stigma "button".

Fruit: a berry like, subglobose capsule enclosed within the persistent calyx tube; seeds ca. 3/locule, wedge-shaped, compressed, brownish.

Distribution and Flowering Season:

Dryish to moist, acidic, shaded stream and river banks, ravine slopes, Cumberland Plateau of Tennessee (Kentucky?) and local in the Blue Ridge of western North Carolina; flowering in April and May.

Special Identifying Features:

H. contracta appears to be a borderline species between the large group "Virginica" (fide Blomquist, 1957) which have strong ridged-reticulations within the calyx tube base and pale areas along the veins of leaves which tend mostly to be roundish, and the "arifolia" group, which have leaves mostly triangular and a hypanthium which is flask-shaped, and which lacks ridged reticulation within toward base. The style extensions in H. contracta (the hornlike portion of style above the stigma button) is for the apical 1/2 bifid while all other reticulate-tubed species in the same complex have the extension entire or merely notched apically. While some other species have a rimlike flare on the calyx tube as does H. contracta, these others develop it medially or distally, while it is usually well below the middle in H. contracta.

Habitat and Management Implication:

H. contracta is locally abundant only in the Cumberlands of Tennessee, there being confined largely to steep, heavily forested streambluffs and ravine slopes that cut through sandstones of the Plateau. The soils are thus quite sandy, usually a fine sandy loam, highly acidic, often shallow or overlying sandstone detritus, usually moist but not wet. In the overstory are gymnosperms such as Canada Hemlock, White Pine, Shortleaf Pine, Virginia Pine, mixed with hardwoods such as Quercus rubra, Q. velutina, Q. alba, Q. coccinea, Carya cordiformis, C. tomentosa, Betula lenta, Tilia heterophylla, Acer saccharum, A. rubrum, Liriodendron, the more mesic species increasingly abundant toward bases of bluffs or ravines. The understory is predominantly ericaceous, the commonest being Rhododendron maximum, Kalmia latifolia, various Vaccinium, Oxydendrum, with the Rhododendron most abundant in the ravine bases, sometimes forming almost impenetrable thickets. Associated herbaceous species may include Polystichum, Athyrium, Dennstaedtia, Osmunda, Thelypteris (particularly T. noveboracensis), Adiantum pedatum, many carices, Erythronium, Polygonatum, Medeola, Trillium erectum, Stenandrium, Smilacina, Uvularia, Ranunculus, Hepatica americana, Anemone quinquefolia, Sanguinaria, Silene virginica, Stellaria pubera, Dentaria, Cimicifuga racemosa, Actaea, Viola blanda, V. hastata, V. conspersa, various Scutellaria, Zizia trifoliata, Thaspium, and several woodland composites, most notably Antennaria, Erigeron pulchellus.

These interesting habitats have been much reduced by coal stripmining in recent years, which ruins both streams and surrounding slopes.

Another problem arises with the heavy cutting of the forests of ravines and streambluffs, with subsequent erosion, over insolation, and invasion by woody and herbaceous weed species. Sometimes this cutting is followed by mechanical site preparation which extends down even into some of the shallower ravines and branches. In any event, Hexastylis habitat is destroyed.

References:

Blomquist, H.L. 1957. A revision of Hexastylis of North America. *Brittonia* 8 (4): 255-281.

Radford, A.E., H.E. Ahles & C. Ritchie Bell. 1968. Manual of the vascular flora of the Carolinas, pp. 400-402.

SPECIES: Hexastylis contracta Blomquist

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		x	x	x			x	
Damage	x				x	x		
No Lasting Effect								x
Beneficial if Done Properly								

Other Comments:

Unless substantial belts of timber along streams and branches are kept, site preparation in the uplands results in much of the erosion moving into ravine bases and stream bottoms, burying vegetation

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Known Range of:

Hexastylis contracta Blomquist



Hexastylis lewisii (Fernald) Blomquist & Oosting [i-4].

Asarum lewisii Fernald

Status: Threatened

Technical Description:

Evergreen, ginger-smelling, perennial Heartleaf, increasing by both shallow, horizontal, pale, long-internoded, sterile rhizomes and short, bracteate, floriferous rhizomes, the primary roots tending to be thickish, with more delicate, fibrous branches.

Leaves: of 2 sorts, one scale-like, often overlapping, subtending petioles and pedicels on short offshoots, broadly ovate or suborbicular, ca. 1 cm long, strongly folded and broadly falciform when viewed from side, pilose-ciliate, the other developing on both sterile-elongate and short-floriferous shoots, erect on clasping based, teretish, fleshy petioles mostly 4-10 cm long, these grooved on upper side and there often sparsely pilose-puberulent, greenish with tints of red, and blades variable mostly 4-8 cm long, triangular to broadly oblong-ovate, ovate, suborbicular or reniform, apically broadly or narrowly rounded or retuse, the margin entire, narrowly revolute and thickened, scabro-ciliate toward base, the base auriculate, the upper surface a rich green, interrupted with broad paler zones along the palmate veins, producing a mottled effect, minutely scabro-puberulent along the veins, particularly toward the base, the lower surface usually smoother, often strongly tinged with red or purple.

Flowers: arising singly from axils of scale leaves on short-spreading or erect rhizomatous offshoots, bisexual, regular, the peduncle erect or nodding, terete, smooth, 1.0-1.5 cm long, lengthening in fruit, pale green tinged with purple; perianth 2-3 cm high, of sepals only; sepals 3, the calyx tube (hypanthium?) 1.5-2.0 cm long, broadly campanulate, flaring just above its middle to form a horizontal low ridge below the rim, the 3 lobes spreading, broadly triangular, 5-8 mm long, the surfaces externally smooth, pale green or flesh-toned mottled liberally with maroon and with parallel narrow purplish veins, internally with lobes and tube down to level of stamens deep maroon, bedecked with erect, long, bristly white hairs, the lower portion of the tube smooth, pale with parallel, strongly raised though narrowish, purple, papillose lines, these not with interconnecting ridges; stamens 12 in 2 series, erect, the fleshy filaments united for most their length to the short-cylindric erect ovary wall and forming a ring around it, the anthers linear with purplish valves and connective, ca. 3 mm long, basifixed, the connective produced beyond in a short apiculus, the carpels 6 united below in a superior ovary, the 6 erect, hornlike styles and stylar extensions forming a ring around the concave ovary apex, fleshy, linear, ca. 2 mm long, purplish, bearing medially on the outside a papillose stigma "button", the extension beyond apically notched; ovules with axile placentation, numerous.

Fruit: a subglobose, berry-like capsule ca. 1.5 cm long, contained within the persistent fleshy calyx; seeds wedge-shaped, compressed, carunculate, ca. 3-4 mm long, brown.

Distribution and Flowering Season:

Sandy loam or silty sandy loam of ravine slopes, and ravine bottoms,

inner Coastal Plain and outer Piedmont, southern Virginia south mostly along the Fall Line, into southeastern North Carolina; flowering mostly from March through April.

Special Identifying Features:

This Heartleaf is part of the largest group, the "Virginica" (tide Blomquist, 1957) of native Hexastylis, these all having style not cleft to the stigma button, leaves pale-mottled along veins, mostly cordiform, and calyx tube at least toward base strongly ridged-reticulate. E. lewisii stands out from these by being the only one of the complex to combine the character of long, leafy rhizomes (these often forming extensive patches several meters in area of scattered to approximate leaves) with calyx tube vertically strongly ridged but not reticulate inside. In addition, while some of this complex produce multicellular trichomes internally on the calyx, this species develops extra long, whitish hairs there which project stiffly inward or upward from the calyx lobes and around the orifice. No other species approaches it in these floral characters.

Habitat and Management Implications:

H. lewisii, like the other Heartleaf of the southeastern U.S., favors an acidic substratum that is high in sand, is usually a sandy loam, a sandy silty clay loam, or a sandy silt loam, and shaded. The overstory varies considerably in that this Hexastylis is found in everything from creek bottoms to tops of ridges. Thus it may be on low sandy rises under bottomland hardwoods, on cutbanks in same, in narrow ravines whose bottoms have mixed mesophytic forest prevalently the beech-maple facies, in low sandy woods heavy with canebrakes and Loblolly Pine, or dry to moist ravine slopes under pine-hardwood with heavy understory of heaths, particularly Kalmia, Vaccinium, or oak-pine crests with the forest floor carpeted with lowbush Vaccinium and Braken Fern. However, the best populations are in the lower ravine slopes and bottoms, usually ferny, and with many colorful spring forbs as associates.

Most who have seen H. lewisii in the field comment on the fact that it develops lots of leaves and length, but few or no flowers. My own observations are the same, but some light on this may be shed when one notes that the "heaviest" flowering is from plants with shoots creeping up rises around tree bases or on steep cutbanks, where the axis of the floriferous shoot is inclined. In that this plant is somewhat "viney" in character, it may be like some viney Aristolochia which may grow profusely over the ground but do not flower much except when climbing.

Threats to this species is many. First, it is endangered by conversion of the upland pine-hardwood to plantation pineland. Usually this involves a clearcut, followed by mechanical site preparation. While the rich bluffland along major streams is not effected usually, the smaller ravines and bottoms are, because of siltation resulting from such disturbance. Very often a small stream bottom may be buried under many inches or even feet. Heavy logging of bottoms

and ravine slopes is nearly as damaging. Hexastylis plants are shallowly rooted and may be washed away in the subsequent erosion. Such plants require loamy substrates and shade of the forest that contributes to the loam; they do not increase, in fact normally do not maintain, in full sun. In addition, heavy logging results in an increase of woody weeds in genera Lonicera, Rubus, Smilax, Pueraria, etc., which tend to choke out forest herbs. Selective or group-selective cutting would be a more suitable approach to such ravine and bottom habitat if the Hexastylis is to be kept.

References:

- Blomquist, H.L. 1957. A revision of Hexastylis of North America. Brittonia 8 (4): 255-281.
- Fernald, M.L. 1943. Asarum lewisii in Rhodora 45: 398-400.
- Radford, A.E., H.B. Ahles & C. Ritchie Bell. 1968. Manual of the vascular flora of the Carolinas, pp. 400-402.

SPECIES: Hexastylis lewisii (Pernald) Blomquist and Oosting

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X	X	X		X		
Damage	X				X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments: I have observed no plants in pine plantations.

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:

Hexastylis lewisii (Fern.) Blomq. & Oosting



945
ARISTOLOCHIACEAE

→ Hexastylis naniflora Blomquist, dwarf-flowered heartleaf

Technical Description

Tufted, smooth, rosulate, spicy-smelling herbs from shallow, thick-rooted rhizomes, these pale, with thin, ovate, scaly bracts, few to several ascending from a more or less erect caudex.

Leaves.-- Alternate, essentially basal from rhizome tips, evergreen (new ones developed toward end of flowering period as old ones die), usually forming a dense, spreading rosette, the blades leathery, orbicular to reniform or broadly ovate, mostly 4-6 cm long, rounded or emarginate, slightly revolute, the bases strongly cordate-auriculate, the upper surface dark glossy green, often reticulately mottled with paler green, the lower surface a dull, pale green; petioles much longer than leaf blades, up to 1.5 dm long, slender, teretish, distally greenish or maroon, proximally paler (when under litter), expanding to clasping pale bases.

Flowers.-- Regular, bisexual, produced singly toward tips of rhizome branches from axils of folded, ovate, scale-leaves on pale, terete, ascending peduncles mostly 3-6 cm long. Sepals 3, joined into a flask-like tube, this short ovoid-cylindric, 0.7-1.0 cm long, slightly broader at its base, there 0.6-0.9 mm wide and cream lined with maroon, distally becoming mostly maroon; calyx lobes ca. 1 cm long, broadly ovate-triangular, spreading-ascending, arching concavely upward, obtuse, the margins broadly revolute, the bases auriculate, the upper surface cream mottled with maroon, puberulent, the backs paler, raised-reticulate. Throat of calyx pilosulous within at its rim, the tube within inconspicuously ridged-reticulate, smooth. Stamens 12, in 2 close-set whorls of 6, erect on very short, stout, pale, fleshy filaments attached to carpel walls or between, the anthers of the set opposite the carpels set somewhat lower, all anthers extrorse, marginal to a broad somewhat flattened connective, the locules 4, each pair linear, 1.5-2.0 mm long, purplish. Carpels 6, lance-ovoid, ca. 1/2 inferior to superior, ca. 5 mm long, joined into a ring from a level just below the fleshy styles downward, the few ovules attached axially at base of locules, the fleshy styles erect, oblong, ca. 2 mm long, bearing round stigmas on the outside at the bases of apical notches.

Fruit.-- Capsules ovoid, few-seeded (usually but 1 ovule/locule), retained in the fleshy calyx tube base and usually released through rotting of the entire structure.

Distribution and Flowering Season

Acidic sandy loam of wooded ravine slopes, Piedmont North Carolina and South Carolina. Flowering in April and May.

Special Identifying Features

H. naniflora has the smallest flowers of any species of its complex in North America, and it might be added, also produces longer peduncles than most. As Blomquist (1957) has stated, its taxonomic affinities are with the "virginica" group, but it differs from any of these in that it lacks a "flare" in the calyx tube which also differs in that it narrows rather than broadens distally.

Habitat and Management Implications

H. naniflora is found on moist to rather dry north-facing slopes of ravines in the Piedmont, usually in the oak-hickory-pine type. The oak species are mostly Q. velutina, Q. falcata, Q. prinus, Q. stellata, Q. alba, Q. coccinea, the hickories usually Carya glabra, C. tomentosa, C. ovalis, the pines mostly P. echinata, P. virginiana. The understory contains Cornus, Cercis, Oxydendrum, but is mostly ericaceous, with Kalmia predominant. Associated herbaceous species are Hepatica americana, Chimaphila, Epigaea, Uvularia, Sanguinaria, Viola, Polygonatum, Polystichum, etc. The Hexastylis plants range in size from a few branching rhizomes to several, the older clumps producing large round tufts of leaves and 20 or more flowers, with the rhizomes and petioles of leaves, usually also the flower stalks buried in unincorporated, moist duff. Generally the plants are around tree bases or under the Kalmia, on steepish slopes along streams. Clear cutting of such slopes would result in considerable mechanical damage to the soils, particularly erosional damage. Also, too much light would be admitted, destroying through bacterial action the organic fraction, drying out and heating up the substrate. No Hexastylis of this species has been observed in contiguous cleared areas. Adjacent pastured woodlands of the same type show few or no plants, probably because of damage done through trampling and subsequent erosion of the slope more than through the plants actually being eaten by livestock.

References

- Blomquist, H.L. 1957. A revision of Hexastylis of North America. Brittonia, 8 (4): 255-282.
- Radford, A.E., H.E. Ahles and C.R. Bell, 1968. Manual of the vascular flora of the Carolinas, pp. 400-402. Chapel Hill, N.C.

SPECIES Hexastylis naniflora Blomquist; dwarf-flowered heartleaf

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X		X
Damage					x			
No Lasting Effect								
Beneficial if Done Properly							X see note	

Other Comments: overplanting with trees would probably involve considerable soil disturbance, and in such a case would have a negative effect.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Hexastylis naniflora Blomquist



ARISTOLOCHIACEAE

Hexastylis speciosa Harper, Harper's heartleaf

Technical Description

Perennial, gingery, rhizomatous, smooth evergreen herbs, the plants in large or small tufts, with few to several short, shallow, aromatic, ovate-scaley rhizomes extending out from the centre.

Leaves: Each rhizome short, bearing but 1 leaf at its apex, this on an erect or ascending, slender, round petiole longer than the blade; blade ovate or triangular, leathery, to 12 cm long, the apex acute, the margin entire, the base either deeply cordate or hastate, a deep, lustrous green with paler mottlings.

Inflorescence: Flower solitary in the leaf axil, unpleasant-smelling, about 3 cm high and 3-4 cm broad on an elongate peduncle but still lower than the leaves.

Flower: Calyx members 3, fused into a bell-shaped, tubular base, this expanded abruptly above into a short-cylindrical flange, this in turn flaring into 3 short-triangular, blunt calyx lobes; calyx surface externally pale tan with copious, maroon flecks, internally in the throat and lobes with broad maroon bands alternating with narrow, pale tan longitudinal bands. Stamens and ovaries fused into a short cylindrical mass, the stamens 12 in a fused ring (actually of 2 whorls), the filaments short and fleshy, the anthers lateral, lower than the connective tips; styles 6, erect, their tips projecting above the stigmas, ovary compound, superior.

Fruit: Fleshy, berry-like, many-seeded, surrounded by the tissue of the calyx, about 1 cm. long.

Distribution and Flowering Season

This wild-ginger is perhaps the rarest in the genus, so far being found only in the inner Coastal Plain of Alabama in 2 counties where it blooms in May and June.

Habitats and Management Implication

H. speciosa is definitely a plant of full or partial shade where it is found rooted in sandy-silt-loam of slight ravine slopes along streams on moist, never wet, substrates. The overstory is usually mixed hardwoods such as black gum, sweet gum, willow oak species, elms, hickories, with a scattering of loblolly and spruce pine; occasionally the Hexastylis works its way up into ravine heads forested with longleaf pine-oak-hickory. Associated herbaceous species are those typical of mesophytic woodlands, and never dense. Understory shrubs are usually low and highbush blueberries, azalea, Sebastiania. Japanese vine honeysuckle is invading these localities and, together with Kudzu, ultimately will drown out both the original herbaceous and shrubby understory. Soil reaction is slightly to quite acidic.

This Hexastylis is, like all other U.S. native species of its genus, intolerant of full sunlight. Selective logging of the overstory would effect it little; clear cutting would eliminate it in a few years even if the soil were relatively undisturbed. Clear cutting accompanied by mechanical site preparation would even more speedily destroy the species, probably through the multiple factors of increased insolation, reduction of the organic content of the soil, and increasing of the 24 hour soil temperature regimen.

References

- Blomquist, H.L. 1957. A revision of Hexastylis of North America. *Brittonia* 8 (4): 255-281.
- Harper, R.M. 1924. A new heartleaf and other interesting plants from Autauga Co., Alabama. *Torreyana* 24: 77-83.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 1279-1280.

Revised March 1980

SPECIES: #116 Hexastylis speciosa Harper. Harper's heartleaf

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X		
Damage								
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Hexastylis speciosa R. Harper



945
POLYGONACEAE!

Eriogonum harperi Goodman, Harper's wild-buckwheat
E. longifolium Nutt. var. harperi (Goodman) Reveal

Technical Description

Biennial from a strong, woody, deep taproot.

Stems.-- Erect, unbranched, often to 2 meters tall, bolting the second season from strong rosettes, brittle, toward base to 2 cm thick, lanate-tomentose with long, sordid hairs, toward and in inflorescence with hairs shorter, more spreading, and admixed with puberulence.

Leaves.-- Rosette leaves with blades mostly oblanceolate, fully 3-4 dm long, to 7 cm broad, spreading or ascending on broadly linear, clasping-based petioles to 2-3 dm long, stem leaves ascending, numerous and overlapping in a spiral, progressively reduced in size and shorter petiolate into the inflorescence, the uppermost sessile, usually lanceolate; leaf apices mostly acute to short-acuminate, the margin entire to slightly crispate-sinuate, the base (of lower leaves) attenuate; upper leaf surface becoming smooth, deep yellow-green; lower surface densely white, silky-tomentose.

Inflorescence.-- An elongate but spreading, profusely branched panicle of cymes, up to 6 dm long, this broadest at its concave summit. Major branches upwardly arching, tomentose, subtended by lanceolate to linear bracteal leaves, the branching cymosely branched again, these secondary branches with nodes bi-bracteolate, producing nearly sessile to stalked flower clusters; each flower cluster a small umbel, the florets on short stalks subtended and concealed by a turbinate, 5-triangular-toothed tomentose involucre ca. 4-5 mm long, the receptacle of this bearing reduced florets and tomentose scales as well pedicels mostly 1.5-3.0 mm long, linear-angulate, villous.

Flowers.-- Symmetrical, either male or bisexual in the same cluster, at anthesis narrowly turbinate, ca. 5 mm long (in fruit nearly doubling in length). Perianth 6-parted, of sepals only, these nearly equal in 2 sets, oblong-linear, pale yellow-green and tomentose with silvery long hairs, spreading at anthesis, erect in bud and fruit, joined at base into an attenuate, pale-tomentose tube which is jointed inconspicuously to the pedicel. Stamens 6, attached along the rim formed by the bases of the perianth lobes, about as long as the perianth lobes, the slender yellow-green filaments long than the short-oblong, 2-celled, reddish, versatile anthers; ovary superior, 1-celled, white-tomentose, styles 3, separate and linear.

Fruit.-- A utricle, the ovary much enlarged in fruit, becoming 5-6 mm long, oblong and strongly 3-angled, the angles produced at the retuse summit into short-triangular teeth; seed lanceolate, ca. 5 mm long, obscurely triangular, smooth, a lustrous, deep, reddish-brown.

Distribution and Flowering Time

Very local on thin soil over limestone of bluffs, ledges and barrens,

northwestern Alabama and east central Tennessee; flowering in July and August.

Special Identifying Features

E. harperi is sympatric with no other species of erigonum, of which there are but 3 other species in the southeastern U.S. Its nearest relatives would be E. floridanum a species of the sandhills in southern Florida, and E. longifolium, of rocky or sandy woods in poor open woods from Louisiana, Missouri and Arkansas west or southwest. E. harperi is a taller plant with much larger leaves, the stem leaves numerous and gradually reduced upward on the stem into the inflorescence. E. floridanum and E. longifolium have fewer, much more distant and reduced, stem leaves, the upper part of the stem thus appearing naked. Neither of these has the same fruit shape, and there are distinct perianth differences.

Habitat and Management Implications

E. harperi grows on thin, heavy soils over limestones or dolomites, these mostly of Mississippian age. In such habitats it is scattered, usually in clearings in forest made up of Juniperus virginiana, Quercus muhlenbergii, Q. shumardii, Carya carolinae-septentrionalis, Cercis, Ulmus rubra, U. americana, U. serotina, etc. Undersotry shrubs are Symphoricarpos, Hypericum frondosum, Viburnum rufidulum, various Prunus. As the overstory increases the erigonum is shaded out. Occasional natural fire would probably tend to increase this species, as it would release through clearing of overstory species. However, logging would have to be selective (such sites, through their difficult terrain almost necessitating this) with every care taken to prevent excessive mechanical disturbance of soil. Effects upon the plants of grazing have not as yet been observed. The steepness or rockiness of the habitat is such that the forage is often unsuitable for any but goats or sheep.

References

- Goodman, G.J. 1947. A new Eriogonum from the southeast. Bull Torrey Bot. Club 74 (4): 329-331.
- Reveal, J.L. 1968. Notes on the Texas Eriogonum. Sida 3: 195-205.

SPECIES Eriogonum harperi Goodman's Harper's wild-buckwheat

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA				
Damage						X		X
No Lasting Effect								
Beneficial if Done Properly	X				X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Eriogonum harperi Goodman



245
POLYGONACEAE

100
Polygonella ciliata Meisn. in DC var. basiramia (Small) Horton
Hairy jointweed

Delopyrum basiramia Small

Technical Description

Taprooted annual.

Stems: Several (up to 20) arching-based but erect or ascending, sparingly-branched, narrow (rarely more than 2 mm broad), wiry, round, but low-fluted, to 8 dm long, because of tabular-sheathing stipules appearing jointed, toward the bases reddish-brown, upward reddish brown in the bristly-ciliar stipular area (the ocrea) and with internodes greenish, the stem surfaces smooth or with minute (visible with 10X hand lens as white flecks) stellate hairs.

Leaves: Basal leaf blades absent at flowering time, those of mid-stem and branches filiform or slightly dilated upward, to 2 cm long (usually shorter), ascending, weakly spine-tipped or sharp-tipped, smooth.

Inflorescence: A narrow, ascending-branched system of slender racemes, these mostly 3 cm or less long, made up of numerous, overlapping, small, bristly tipped ocreae (ocreae) from each of which protrude slender, short, pale flower stalks.

Flowers: Small, the lowest opening first, about 1.5 mm long, the perianth (usually of 5 unequal sepals) members oblong or obovate, flat, joined toward the base, chalk white, slightly spreading. Stamens usually 5, attached at ovary base, some with broadened filament bases, the anthers projecting slightly beyond the sepals, round, blackish. Ovary superior, 3-angled, pale, elliptic, bearing a small tuft of glandular hairs (the stigmatic area) at its apex.

Fruit: A trigonous, reddish-brown akene about 1 mm long, this loosely enclosed in the reflexed fruiting calyx, and its beak projecting beyond.

Distribution and Flowering Season

This variety is restricted to 2 counties in the southernmost part of the Florida Highlands, and is locally frequent on the pure, whitish sands of old dunes. It blooms in fall, fruits in late fall and winter.

Special Identifying Features

It is most similar in appearance to two other wiry-stemmed Polygonellas, P. ciliata var. ciliata of more general distribution in peninsular Florida and P. gracilis (Nutt.) Meisn., which is on sandy soils in the southeastern U. S. Coastal Plain. From the former it differs in its many-stemmed habit (P. ciliata var. ciliata usually produces but 1 strong shoot from the taproot) and from the latter, which is simple stemmed, it differs in having fringed ocreae.

Habitats and Management Implication

P. ciliata var. basiramea is found in clearings in the Sand Pine-evergreen scrub oak type. The main overstory species are themselves low, mostly Sand Pine and Florida Hickory, with an admixture of Ilex, Osmanthus, Quercus myrtifolia, Q. chapmanii, Q. maritima, and an understory consisting of various sclerophyllic shrubs, including Ceratiola, some other polygonellas, shrubby compositae such as Garberia, and Bumelia, palmetto, etc. Herbaceous components such as this plant are generally on sandy clearings, often lichenous and with Selaginella. Common genera would be Andropogon, Aristida, various compositae, pinweeds, sand spurrys, Euphorbia. Several species of threatened or endangered plants are here, and all appear to be plants of sandy clearings in old dunes. In the past these same areas have been swept by fires, this revealing the almost pure sand, this in turn subject to wind action. The forest has always been of a marginal sort, producing scrubby oaks, hickories, pines. The areas have more fire protection now so that clear cutting and brushing would probably promote increase of the herbaceous species. So as well would site operations of the sort that would expose the sands without totally removing seed sources of the same herbs.

The greatest enemy is the rapid conversion of such scrub lands either to massive housing and other real estate development, together with the greatest hazard of all, the orange grove. Few of the endangered species mentioned above are found in the well maintained orange groves which now cover most of what was the South Florida highland scrub.

References

- Horton, J. H. 1963. A taxonomic revision of Polygenella (Polygonaceae). Brittonia 15: 177-203.
- Small, J. K. 1924. Plant novelties from Florida. Bull. Torr. Bot. Club 51: 379-393.

Revised March 1980

#148 Polygonella ciliata Meisn. in DC. var. basirama (Small Horton;
SPECIES: Hairy jointweed

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect								
Beneficial if Done Properly	(NA) X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Polygonella ciliata Meisn. in DC var. basiramea (Small) Horton



POLYGONACEAE

Polygonella macrophylla Small, ~~Large-leaved jointweed~~
~~jointweeds~~

Technical Description

Shrublike perennial.

Stems.--The one to several shoots stiffly erect from a strong taproot, to more than a meter tall, glabrous, round in cross section, but finely ribbed, reddish-brown to gray-green, simple or with short erectish leafy lateral branches and branching in the inflorescence.

Leaves.--Numerous, alternate, ascending or erect, the lowest largest, mostly obovate, cuneate or broadly spatulate, mostly 2.5-6.0 cm long, 1.0-2.5 cm broad, flat, rather leathery, the tips rounded, the margins entire, often pale, the base cuneate, sessile or nearly so. Ocreae short-cylindric, firm, dark to pale brown, entire. Stem leaves gradually reduced in size upward, grading into bracts.

Inflorescence.--A dense to somewhat open system of ascending or spreading sessile racemes (sometimes branched), these short-oblong or ovate in outline, with broadly funnelform, overlapping ocreolae.

Flowers.--Mostly bisexual, on slender stalks projecting from the ocreolae, terminating in a narrow perianth tube that gradually expands upward, then flares into the 5 calyx segments (the longest about 3.0-3.5 mm long); the three outer sepal lobes broadest, with short claws and broadly ovate or obovate to suborbicular blades which are white at blooming time; inner sepal lobes narrower; all calyx lobes erect or slightly spreading in bloom, spreading or even reflexed in fruit. Stamens 5, about as long as the sepals in bloom, the white filaments lineal, some broader than others, the anthers white or yellow roundish. Ovary lance-ovoid, trigonous, its tip producing 3 narrow distinct style branches and stigma bottoms.

Fruit.--Akene lance-ovate, strongly trigonous, about 3 mm long, pale yellow brown, smooth, lustrous.

Distribution and Flowering Season

This species is local on the white sands of clearings in the sand pine-evergreen scrub oak toward the coast of the Florida Panhandle and in Baldwin County Alabama. It flowers in late fall (mostly October) and fruits in November.

Habitats and Management Implication

P. macrophylla is always on deep, white sands, either on clearings in the sand pine scrub or in open stands of overstory. It is associated with such shrubby genera as Ceratiola, Conradina (an aromatic, blue-flowered, shrubby mint), Calamintha, and sandhills herbs such as Balduina, Heterotheca, Andropogon, Panicum, Aristida, Aqalinis. Much of this evergreen scrub complex is being leveled for the purpose of housing and such would of course eliminate the species. Some other areas of it are being clear-cut and put to slash pine or longleaf pine, and the species may at first

increase in these areas until such time as the crowns of the pines close. In nature the species probably maintained itself through fire disturbance sufficient to make clearings in the scrub.

References

- Small, J.K. 1933. Manual of the Southeastern Flora, page 449. Chapel Hill, N.C.
- Horton, J.H. 1963. A taxonomic revision of Polygonella (Polygonaceae).
Brittonia 15: 177-203

SPECIES: #149 Polygonella macrophylla Small Jointweed.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X				
Damage	X		NA				If Sand	
No Lasting Effect							Pine OK	?
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Polygonella macrophylla Small



245
POLYGONACEAE

Polygonella myriophylla (Small) Horton ^{F-21} Small's jointweed
Dentoceras myriophylla Small

Technical Description

A sprawling, mat-forming shrub.

Stems: The many elongate branches frequently rooting at lower nodes, and issuing from a deep, essentially taprooted stock. Shoots mostly slender, zig-zag, the lower bark reddish-brown, cracking and partly separating in long, flat, interlacing strips; mid and upper shoot parts with bark paler reddish brown, the branchlets greenish. Lowest branches of main shoots erect, slender, zig-zag, with the rather close nodes producing short, upright and leafy lateral branches and the uppermost branches of these main shoots terminating in narrow systems of racemes.

Leaves: Lineal, spatulate or clavate, fleshy, somewhat broadened, slightly flattened and definitely thin-edged at the very tips, mostly 3-10 mm long, smooth. Ocreae and ocreolae (stipules), fringeless, unequally cup-shaped, the longest part of the cup rim produced into 3 low broad thin teeth.

Inflorescence: Flowers in racemes, these short, several on spreading-ascending stalks toward the tips of the longer shoots, the total inflorescence a loose cylinder. Ocreolae of racemes similar to the stem ocreae, but overlapping and toothier, scarious. Racemes roundish or short-oblong, rarely 2 cm long, in bud narrower with the flower stalks concealed by the ocreolae and the outer sepals hood-like.

Flowers: In bloom projecting on pale stalks to 3 mm long, symmetrical, the sepals ascending, spreading as the fruit forms. Sepals 5, the outer 3 broadest, usually oblong or obovate, 3-4 mm long white with a green strip medially, the inner narrower, all wavy-margined and blunt-tipped. Stamens usually 5, the filaments white, with broad, flat bases, narrowing upwardly and slightly projecting the reddish round anthers beyond the sepal tips. Ovary 3-angled, elliptic, the narrow tip producing 3 slightly spreading style branches, each terminating in a stigma button.

Fruit: Akene reddish-brown, smooth, trigonous, about 3-3.5 mm long, its acute beak slightly projecting beyond or equalling the tips of the longer sepals.

Distribution and Flowering Season

P. myriophylla is restricted to the sandy scrub of the southern part of the Florida Highlands, where it blooms and fruits intermittently all year.

Special Identifying Features

It is part of that complex which has no ciliae (bristles) on the edges of its ocreae (stipules) and which has rather long style branches. In appearance it is closest to P. americana, which is found on sandy open

soils through most of the lower South, but not in Florida. However its very low, dense mats of shoots and leaves, shorter inflorescences with more ocreae/unit length distinguish it from that species which is erect, has longer inflorescences, larger flowers, a more strongly winged fruiting calyx, and narrower leaves.

Habitats and Management Implication

This rare species is in the same situations as P. macrophylla (which see) and is subjected to the same environmental stresses and dangers. It has become quite rare because of the increase of real estate development and of orange groves within its former range.

References

- Small, J. K. 1933. Manual of the Southeastern Flora, p. 450.
Horton, J. H. 1963. A Taxonomic Revision of Polygonella Polygonaceae. Brittonia 15: 177-203.

Revised March 1980

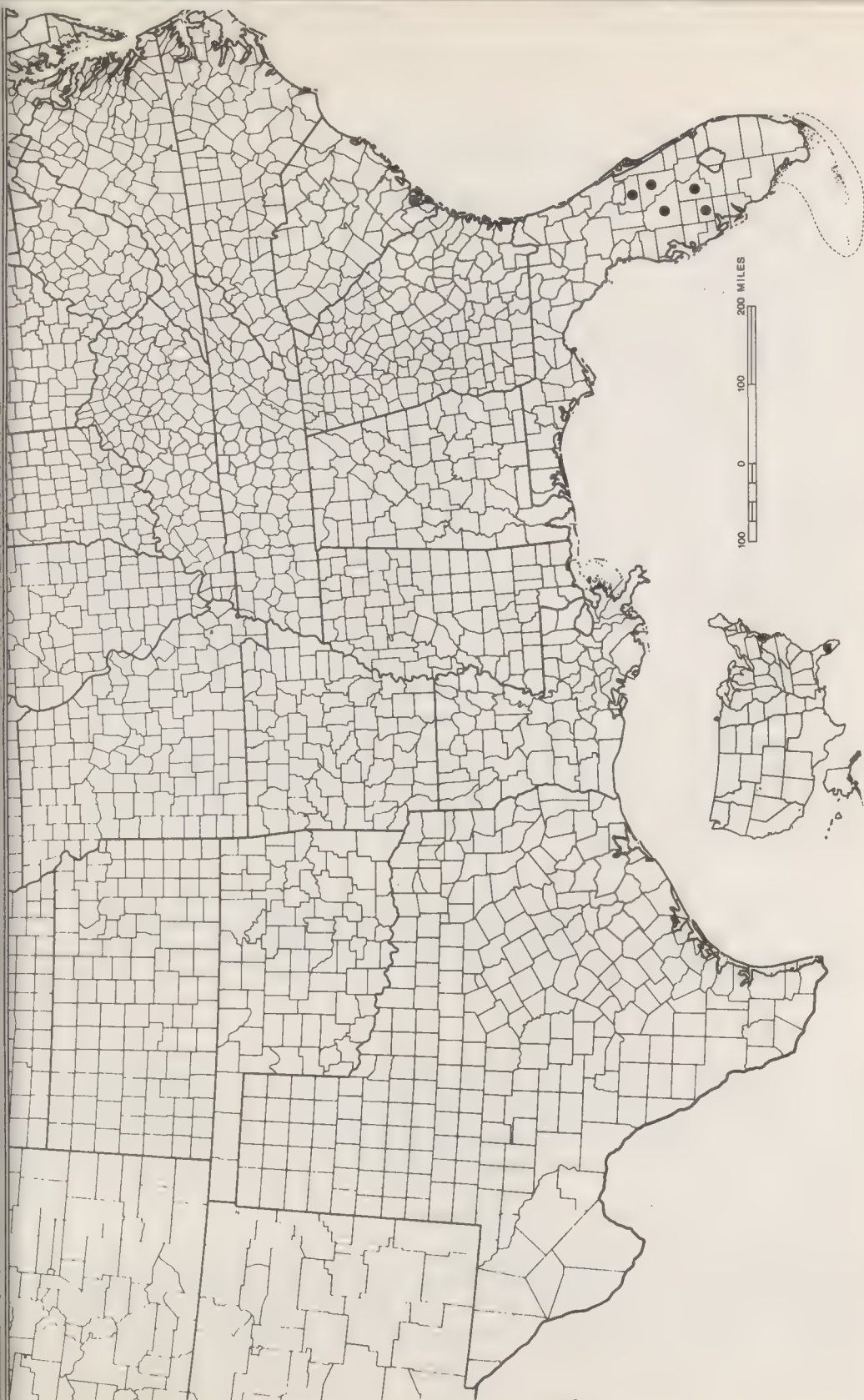
SPECIES: #150 Polygonella myriophylla (Small) Horton. Small's jointweed

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage	X		NA					
No Lasting Effect								?
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980



MAP 150. POLYGONELLA MYRIOPHYLLA

PORTULACACEAE

Portulaca smallii P. Wils. ^{Small's purslane}

Technical Description

Succulent annuals from shallow, diffuse rootstocks.

Stems.--Main axis very short, diffusely spreading-branching, forming small mats, the main branches prostrate to suberect, slender, terete, succulent, toward tips and along branches ribbed, the surface reddish, smooth save at nodes where white-pilose.

Leaves.--Alternate, estipulate, simple, spiralled, crowded and spreading-ascending, succulent, linear to narrowly spatulate, mostly 0.7-1.5 cm long, nearly terete, greenish or tinged with red, the petioles short, stout, appearing jointed to stem.

Flowers.--Regular, perfect, terminal or in small clusters on shoot and branch tips, closely surrounded by the crowded upper stem leaves, thus with strong tufts of white pilosity around their bases; sepals 2, distinct, broadly triangular, ca. 3 mm long; petals 5, distinct, first ascending, then spreading, (the flowers when expanded ca. 1 cm wide), pale pink, oblong-elliptic to elliptic-ovate, ca. 3 mm long, apically rounded apiculate; stamens 8-12, the filaments filiform; ovary superior, broadly ovoid, placentation free-central; style branches 4, linear.

Fruit.--Capsule broadly ovoid, smooth, circumsessile, ca. 3 mm high (excluding the beak formed by the withered perianth), pale brown; seeds very numerous, cochleate (shaped like a snailshell) nearly round, ca. 0.7-0.9 mm long, somewhat laterally compressed, the rounded back and sides papillose-muriculate in longitudinal lines, the surface silvery-black.

Distribution and Flowering Season

Shallow sandy soils in and around granite outcrops, Piedmont, very local, Virginia south through North Carolina, Georgia; flowering from June to frost.

Special Identifying Features

This Portulaca, with its silvery-pilose nodes, strongly maroon pigmentation of stem and shoot, mostly resembles P. pilosa, but has somewhat larger petals that are not retuse and are pink rather than deep magenta-rose; the seeds are slightly larger, having silvery-black tones rather than the deep reddish tones of P. pilosa.

Habitat and Management Implications

P. smallii is always on or close to granite extrusions, is usually rooted in shallow, sandy-silty, inwash soils of the sort that collect in the shallow depressions or cracks in granite. During periods of heavy rainfall the plants may be submerged in the

shallow pools, or develop on moist to wet edges of such pools. However, most of the flowering and fruiting takes places from June onward, periods that are usually comparatively dry. Most of the portulaca are in full sun, with herbaceous associates including Panicum lithophilum, P. flexile, other Panicum, Sporobolus, Agrostis, Cyperus granitophilus, Arenaria (by this time dying back), Opuntia, Talinum, Viguiera, Oenothera, Crotonopsis, Bulbostylis capillaris, etc., in short, plants that are adapted to ecological extremes of heat and moisture. Invasion of the granitic openings by woody plants is very slow, with the ultimate overstory being upland oak-pine-hickory, this usually rather open and generally of a poor quality because of the shallowness and sterile nature of the soil.

The main danger to this plant is from the quarrying of the granite. Another problem is that the larger granite outcrops have in recent years been the focus of attention for picnickers and curiosity-seekers, many of these "mechanized", and seeking a thrill by driving various sorts of vehicles over the granite without consideration of the sensitive vegetation. Larger granite glades that harbor the Portulaca and which are parts of public lands should be protected against this enough to allow the existing populations to maintain or increase.

References

- Radford, A. E., C. R. Bell, & H. E. Ahles. 1968. Manual of the vascular flora of the Carolinas, pp. 433-434. Chapel Hill, N. C.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 495-496. Chapel Hill, N. C.
- Wilson, P. 1932. In Portulacaceae by P. A. Rydberg. North American Flora 21 (4): 335. New York.

SPECIES Portulaca smallii P. Wilson. Small's purslane

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			NA	
Damage								X
No Lasting Effect	X							
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Portulaca smallii P. Wils.



PORTULACACEAE)

Talinum appalachianum W. Wolf [Appalachian fame-flower.

Technical Description

Succulent, smooth perennial herb from a fleshy, elongate but thickish, terete, simple or apically forking, lustrous, pale brown, taproot-like caudex, this bearing toward its apex a scattered, spiral system of narrowly triangular-linear scale leaves.

Leaves.-- Toward base of stem and on caudex narrowly linear-triangular, scale-like; foliage leaves crowded toward shoot tips, terete, linear ascending, the larger ones 3-4 cm long, 2-3 mm thick, short-subulate-tipped, dull green, the sessile bases slightly clasping, appearing "jointed" to stem.

Inflorescence.-- Mostly 5-10 cm long; peduncles 1 or 2, axillary to shoot leaves toward shoot apex, erect, linear-filiform, terete, straw-colored, branching above the middle to form an open, few-flowered cyme, the branches and pedicels subtended by opposite pairs of narrowly triangular, scarious bracts 3-4 mm long.

Flowers.-- Regular, bisexual, rotate; sepals 2, distinct, broadly ovate, ca. 2 mm long, thin, pale green suffused with pink, reticulately veined; petals 5, distinct, spreading, oblong, ca. 5 mm long, 3 mm broad, rounded-tipped, a lively lavender-rose; stamens 5 (-6-8), usually alternating with petals, distinct, the ascending filaments filiform, deep pink, 2.5-3.0 mm long, the bright yellow anthers oblong, 0.7-0.8 mm long; ovary superior, 1-locular, ovoid, ca. 1.5 mm high, style simple, narrowly linear, erect, pink, 1.0-1.2 mm long at anthesis, the stigma at first appearing button-like but actually with 3, involute-margined, pale, papillose lobes.

Fruit.-- Capsule ovoid, 4 mm long, green, smooth, splitting into 3-4 thin valves;; seeds cochleate (snail-shaped), several from a free central placental columella, dark reddish-brown, lustrous though minutely roughened.

Distribution and Flowering Time

Southwestern tip of Appalachians along Coosa River in Chilton and Coosa Counties, Alabama; flowering from May into July.

Special Identifying Features

This Talinum, according to an Alabama student of the genus, Dr. W. Wolf (1939), is not closely related to other southeastern terete-leaved species, the erect and forking caudex habit being in distinct contrast to the more irregular habit of T. mengesii and T. teretifolium. Also this is the smallest of the Alabama species in size of plant and size of flower. The stamens are consistently less in number also, there being 12 or more in T. teretifolium, 40 or more in T. mengesii. Its flowers open toward dusk, thus later than in the other two arenaceous-outcrop species.

Habitat and Management Implications

T. appalachianum grows on the thin soil that accumulates in the rubble of of schistaceous granite covering outcrops of same, with the erect caudexes hidden by the gravel, only the green leaves and inflorescences protruding. The habitat is quite dry, usually clearings in oak-pine forest, the pines being a mixture of Shortleaf and Loblolly with an occasional Longleaf, the oaks primarily Quercus stellata, Q. coccinea, Q. falcata, Q. nigra, Q. coccinea, Q. velutina. Hickories such as Carya tomentosa, C. pallida, C. glabra are scattered throughout. Understory shrubs in the area are Vaccinium arboreum, V. stamineum, V. elliotii and low bush Vaccinia, Forestiera, Bumelia, Rhus, Smilax, etc. Herbaceous associates include Opuntia, Delphinium carolinianum, Sporobolus, Aristida, Danthonia, Andropogon, Dichanthelium, Panicum, etc. The forest, because of the thin soils is of a generally poor quality and unsuitable for conventional mechanical methods of site preparation. There is history of fire in the area, this probably aiding in slowing down herbaceous and shrub competition on the sunny clearings the Talinum occupies. The only presently known locality is threatened, since a part of it is often used or traversed by heavy highway equipment or powerline maintenance crews.

References

- Small, J.K. 1933. Manual of the southeastern flora, pp. 403-404. Chapel Hill, N.C.
- Wolf, W. 1936. The status of Talinum in Alabama, Amer. Midl. Nat. 22: 315-332.

SPECIES Talinum appalachianum W. Wolf. Appalachian fame-flower

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			X	
Damage								
No Lasting Effect								
Beneficial if Done Properly	?				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Talinum appalachianum W. Wolf



215
PORTULACACEAE

→ Talinum calcaricum Ware [1-4]

Status: Threatened

Technical Description:

Succulent, smooth perennial from a stout, fleshy, knobbly, elongate to compressed, simple or branched, erect or spreading-ascending-branched caudex, its crown often bearing the fibres of old, persistent leaf fibres, its base fibrous-rooted.

Stems: subterranean or surficial part as described above, the leafy shoots arising singly, oppositely or alternately, simple or forking or alternately branched from the caudex, stiffly erect or ascending, pale green suffused with pink or red, 3-6 (-10) cm long, the nodes close-set and spirally arranged.

Leaves: linear, terete, 3-5 cm long, apically narrowly conic and callused, basally clasping like a suction cup, gray-green or deep green suffused with some reddish pigment, ascending and approximate, usually rather dense.

Inflorescence: Peduncle slender, terminal, erect or ascending, 5-15 cm long, pale green with tints of pink or red, simple and bractless below, branching only in the upper ca. 1/5, there forming a cyme of few-to-many showy flowers, the slender but stiffish pedicels often maroon, 50 1.5 cm long, each subtended by a connate-perfoliate, bilobed, thin, bract, this whitish, each lobe more or less triangular, at most 3 mm long, short-cuspidate.

Flowers: regular, bisexual; sepals 2, distinct, thin (scarious) pale, broadly ovate to suborbicular, entire, ca. 3 mm long, persisting on fruit; petals 5, distinct, unfolding in afternoon, then spreading, a deep, bright rose, narrowly obovate, ca. 1 cm long, apically rounded, sometimes mucronulate, entire, cuneate-based; stamens numerous, somewhat variable in length but up to 5 mm long, the filaments filiform, reddish, the anthers basifixed, oblong, ca. 1.0 mm long, yellow; ovary superior, usually tricarpellate, with ovules many, free-central, the ovary body ovoid to broadly ellipsoidal, ca. 2.5 mm high, the style filiform, exerted beyond the longest of the stamens, there trilobed and papillate-stigmatose.

Fruit: Capsule ovoid to obovoid, 4-6 mm long, yellowish-green, opening by 3 subequal valves, subtended and clasped by the 2, erect and persistent sepals; seeds dull gray, round but laterally compressed, ca. 1 mm wide.

Distribution and Flowering Season:

Nashville Basin and calcareous lowlands of middle Tennessee and northern Alabama respectively; open limestone glades or limey clearings, locally abundant; flowering from early June through August.

Special Identifying Features:

Southeastern Talinum are more easily recognized to genus than as species, this being the case usually where genera are as distinctive as this one. However, of the 4 known southeastern species, T. appalachianum has the least stamens (usually but 5); T. teretifolium

has a style shorter than the stamens, or rather its style is not exerted. The only similar species as to stylar character is T. mengesii, and T. calcaricum differs from it by having fewer seeds (10-25, rather than more than 25), grayish and dull seed coat (rather than nearly black and lustrous), a definitely trilobate stylar apex and stigma (rather than capitate or nearly so), an ovoid to obovoid (rather than subglobose) capsule. While habitat differences are risky to use with many groups, that is not the case here, in that, unlike other southeastern Talinum, T. calcaricum is as the name suggests, a calciphilic species.

Habitat and Management Implications:

T. calcaricum is a species of open limestone glades, sharing the thin outcrop soils with Nostoc, various lichens and mosses, annual Panicum and Sporobolus, Cyperus, Juncus, Allium, Commelina, Arenaria, Sedum, various Leavenworthia, Delphinium virescens, Psoralea subacaulis, Petalostemon gattingeri, Scutellaria parvula, Satureja glabella, S. arkansana, Verbena, and many composites. All these are rooted in the thin, inwash or outwash detrital soils over limestones of Ordovician age, or on the clayey soils that accumulate around the outcrops. All might be considered pioneer invaders of such outcrops, giving way to increasing numbers of woody plants, usually first to junipers, which in turn are succeeded by mixed hardwoods predominated by oaks, hickories and hackberries with ash, elm, hard maples. The rocky clearings were maintained or created historically by fire and/or erosive forces, perhaps occasionally by severe storms such as the tornadoes that periodically strip lanes through some of these areas today.

The greatest current risk to these habitats today comes from urban expansion and the need for more and more industrial and residential space, together with a more pastoral hazard involving conversion of some open glades to low-quality pasture. This last damages or destroys the plants, in that the stock trample them or compact the thin soils.

References:

- Small, J.K. 1933. Manual of the southeastern flora, pp. 493-494.
- Ware, Stewart. 1967. A new Talinum (Portulacaceae) from the cedar glades of middle Tennessee. Rhodora 69 (780): 466-475.
- _____. 1969. Seed germination in cedar glade Talinum. Ecology 50 (1): 137-140.

SPECIES: Palinum calcaricum Ware

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy	X				X	X		
Damage		NA	NA	NA			NA	
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:
Talinum calcaricum S. Ware



245
PORTULACACEAE;

→ Talinum mengesii W. Wolf [1-4].

Status: Threatened

Technical Description:

Succulent, smooth perennial from a fleshy, stout, knobby, elongate, terete to compressed, simple or branched, erect or spreading-ascending-branched caudex, the crown often bearing old leaf base fibres; roots slender, fibrous.

Stems: aerial part of caudex simple or stiffly alternately or oppositely branched, or branches several from the apex, densely leafy, erect or ascending, pale green suffused with red or pink, mostly 5-15 cm high, terete, thickish.

Leaves: close-set and spirally arranged on the main stem and branches, particularly toward shoot bases, ascending, linear, to 6 cm long, 3 mm thick, terete, deep green, sharply conical apically, the bases attaching suctioncup-like, bearing internally just above the attachment a thin, ligule-like pair of stipules.

Inflorescence: Peduncles bractless, arising apically from main axis and branches, mostly 1-2 dm long, slender, terete, stiffish and wirelike, producing an open cyme of few-to-many flowers, usually this scorpioid, with an average of 3 primary branches, the stiffish, pedicels arising from inner side, subtended by scarious, lance-linear or subulate, connate-perfoliate-based bracteoles and to 1 cm long.

Flowers: showy, regular, bisexual; sepals 2, distinct, broadly to narrowly ovate, thin, 4-5 mm long, pale green tinged with pink or maroon, early deciduous from fruit; petals 5, distinct, spreading, opening in afternoon, elliptic to narrowly obovate, a bright rose-pink, ca. 1.5 cm long, apically rounded, entire, cuneate-based; stamens 40-100, distinct, the filaments filiform from short-scarious bases, somewhat unequal, but up to 5 mm long, the anthers short-oblong, basifixed, 0.5-0.8 mm long, bright yellow; ovary superior, tricarpellate, the numerous ovules free-central but concentrated toward apex of columella, the style well exerted beyond the longer stamens, linear, unbranched, the stigma capitate, 3-lobed, not branched.

Fruit: Capsule subglobose or very broadly ovoid, yellow-green, when ripe 5-6 mm high, 3-valved; seeds numerous, laterally flattened, round in outline but concave on the sides at center of coiled embryo, ca. 1 mm wide, nearly black, shining.

Distribution and Flowering Season:

Granite and sandrock outcrops, Cumberland Plateau, Ridge and Valley, Blue Ridge, and Piedmont, southern Middle Tennessee south into Piedmont Georgia and Alabama; flowering from late June through August, intermittently to frost.

Special Identifying Features:

As Wolf (1920) and Ware (1967, 1969) have noted, it was thought for years that there was but one terete and linear-leaved flameflower in the southeastern U.S. east of the Mississippi, and that was called T. teretifolium. Wolf discovered two more in Alabama (1920 et al), and Ware a third (1967). T. mengesii Wolf stands out from all these in its larger flowers, in having more stamens (40-100),

and in having the longest style exsertion (often half again longer than the filaments). The style apex in this species is lobeless, only the capitate stigma being lobed. Nearest it in flower size and overlapping in stamen number and stylar character is T. calcaricum Ware, but this species is a calciphile, its sepals persist on the fruit, its seeds at maturity are grayish, dull, rather than nearly black and lustrous. Of the characters used by Wolf and Ware, stylar length appears to be the most troublesome and variable, in that in T. mengesii the style may in some cases so short as barely to be exerted, thus in this regard overlapping T. calcaricum. (It is suggested that flowers of each species be pressed in the field so as best to preserve the most critical characters; many collections have not been made this way, and are virtually useless for critical comparison!)

Habitat and Management Implication:

T. mengesii is locally abundant on and around acidic rock outcrops such as granites and sandstones. These outcrops, where soil can accumulate to depths to support forest, produce an oak-hickory-pine type, the oaks being mostly upland species (except where streams cut through) such as Quercus falcata, Q. coccinea, Q. marilandica, Q. stellata, Q. margaretta, Q. rubra, Q. prinus, sometimes in the Piedmont Q. georgiana, the hickories mostly Carya glabra, C. pallida, C. tomentosa, the pines being mostly P. virginiana, P. echinata, P. taeda (rarely P. palustris). Understory trees and shrubs are commonly Cornus florida, Chionanthus, Kalmia, Oxydendrum, Vaccinium (high and low bush), Rhus; Smilax and poison-ivy, Gelsemium, Anisostichus, Parthenocissus, Vitis, Lonicera abound. Herbaceous associates are typical of perennial and annual pioneers of granite and sandstone, such as, bryophytes, lichens, Selaginella, Panicum, Agrostis, Andropogon, Digitaria, Sporobolus, Bulbostylis, Fimbristylis, Juncus, Allium, Polygonum tenue, Crotonopsis, Hypericum gentianoides, Oenothera, Liatris microcephala, Coreopsis, many Aster, Solidago, Viguiera (in Piedmont and Blue Ridge), etc. The Talinum is found in full sun or light shade, roots in cracks in rock or in areas such as shallow drying pools on the rock or around it, anyplace where shallow inwash or outwas accumulates in full sun. As soil depth increases and as woody plants move in, the herbaceous plants lose ground, are finally eliminated. As in the case of other granite and sandstone glade plants the openings are maintained through fire or erosion, closed through invasion by trees, shrubs and shade tolerant perennials. This habitat is damaged or destroyed by quarrying of the rock, by development of outcrop areas for residential, recreational or industrial use. Logging of the rather low quality forest on or around such glades may have comparatively light impact. Conversion of outcrop areas to pasture has a negative effect, in that livestock tend to trample and crop the plants around the temporary pools. The same trampling effect can be gotten in some parks, when hiking or motorized vehicles are allowed on the sensitive areas.

References:

- Small, J.K. 1933. Manual of the southeastern flora, pp. 493-494.
- Ware, Stewart. 1969. On the ecology of Talinum mengesii (Portulacaceae).
Bull. Torr. Bot. Club 96 (1): 4-10.
- Wolf, W. 1920. Notes on Alabama plants. Am. Midl. Nat. 6 (8): 151-155.

SPECIES: Talinum mengesii W. Wolf

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Craze
Destroy		NA	NA	NA			NA	
Damage								X
No Lasting Effect	X							
Beneficial if Done Properly					X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Known Range of:
Talinum mengesii W. Wolf



100

245

CARYOPHYLLACEAE

Arenaria alabamensis (McCormick, Bozeman & Spongberg) Wyatt [1-7],
Alabama sandwort

Minuartia alabamensis McCormick, Bozeman & Spongberg

Technical Description

Strongly tufted, delicate, smooth, winter annual from shallow, fine, diffuse roots and overwintering small rosettes.

Stems.--Capillary, greenish with maroon tints, 4-8 (-10) cm high, erect, usually several from a rosette, simple or with several branches from near the base.

Leaves.--Rosette leaves spatulate, somewhat succulent, usually under 1 cm long, smooth. Stem leaves spreading, opposite, the lowest on close nodes, becoming more distant upward, largest at about mid-stem or just below inflorescence branches, linear or subulate, 2-6 mm long (usually around 3), 1-2 mm broad, bluntish-tipped, entire, the bases narrowed, clasping.

Inflorescence.--Flowers from solitary and terminal to several, each terminating elongate, upwardly arching, axillary flower stalks or long-stalked on axillary inflorescence branches, in any case the inflorescence delicate and open.

Flowers.--Sepals 5, about 1.0-2.5 mm long, ascending, narrowly ovate or oblong, obtuse, entire with broad thin borders and greenish, almost veinless, convex backs. Petals 5, short-oblong, 1-3 mm long, at summit notched or obtuse, all white. Stamens 8-10, about as long as the sepals, the distinct filaments slender, the nearly round anthers about 0.2 mm long. Carpels mostly 3, the superior, 1-loculed ovary about as long as the sepals, the stigma branches linear, 3.

Fruit.--Capsule ovoid-conic, about 3 mm long, dehiscent along three sutures. Seeds numerous, blocky, about 0.5 mm long, reddish-brown, nearly smooth.

Distribution and Flowering Season

Granitic outcrops, in the Piedmont of Alabama and North Carolina. Flowering March into May.

Special Identifying Features

This recently described species is superficially like A. uniflora (Walt.) Muhl. and A. glabra Michx. which are also plants of arenaceous or granite outcrops. However, it is an even smaller plant, more delicate than either, and in the field it is easily picked out because of its smaller flowers.

Habitat and Management Implication

A typical habitat would be small depressions or cracks in the granite where wash and wind have deposited substrate and where some water accumulates. Here it will occupy, (together with other Arenaria, Diamorpha, Lindernia, and Talinum)

considerable area and this is nearly always in full sun. The granite outcrops, where soil has had opportunity to form, support trees such as Juniperus, Pinus echinata, P. taeda, Quercus prinus, Q. coccinea, Q. velutina, Q. rubra, etc., upland hickory species, Ulmus alata, Fraxinus, Diospyros, and a variety of hardwoods typical of either the oak-pine or oak-hickory types. As such stands develop on the granite, the herbaceous, open outcrop species are shaded out by the encroaching shrubs and trees.

The greatest threat to a granite outcrop endemic such as this would be use of the granite by quarriers. Borders of the vernal pools this grows in are also trampled to mud by livestock and are likewise destroyed through careless intrusions by people, particularly "buggy" drivers and motorcyclists. The outcrops are poor sites for trees, these usually of poor form, cut mainly for wood and posts.

Selected Readings

- McCormick, J. F., J. R. Bozeman and S. Spongberg. 1977. A taxonomic revision of granite outcrop species of Minuartia Brittonia 23 (2):149-160.
- McVaugh, R. 1943. The vegetation of the granitic flat-rocks of the southeastern United States. Ecol. Monogr. 13: 119-116.
- Radford, A. E., H. E. Ahels, & C. R. Bell. 1968. Manual of the vascular flora of the Carolina, 441-443.
- Wyatt, R. 1977. Arenaria alabamensis: A new combination for a granite outcrop endemic from North Carolina and Alabama. Bull. Torr. Bot. Club 104(3): 243-244.

Note--Subsequent to first publication of this paper this sandwort has been found on sandstone outcrops in the Cumberland Plateau of Alabama (Winston County). See revised map.

Revised March 1980

#49 Arenaria alabamensis (McCormick, Bozeman & Spongberg) Wyatt.
SPECIES: Alabama sandwort

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy								
Damage								X
No lasting effect	X	NA					NA	
Beneficial if done properly					X	X		

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Arenaria alabamensis (McCormick, Bozeman & Spongberg) Wyatt



Arenaria cumberlandensis Wofford & Kral [1-2]

Status: Endangered

Technical Description:

Strongly tufted, delicate, smooth perennial from a slender taproot, perennating by short, basal offshoots.

Stems: erect or spreading, forming small cushions of decumbent bases, (8-) 10-15 (-20) cm high, very slender, 0.4-0.8 mm thick, terete, the nodes swollen, close-set toward plant base, internodes progressively elongating upward on stem, thus branching in the inflorescence or terminating in a single flower stalk.

Leaves: opposite, estipulate, gradually reduced in length and width upward on stem, the largest near base, spreading or spreading-recurved, (1-) 2-3 (-4) cm long, mostly 1-3 mm wide, linear-oblongate or linear-spathulate, obtuse to broadly acute, entire with a narrow glassy margin, attenuated or narrowly cuneate to a narrow but clasping base, thin, equally bright green on both sides, the midrib and veins around midrib a single row, the areoles on either side elongate; leaves at base of pedicels shortest, usually 1 cm or less long, linear, spreading or ascending.

Flowers: regular, bisexual, solitary at stem tips or 2, rarely 3 and subcymose, the pedicels capillary, 5-10 times as long as flowers; calyx broadly campanulate, truncate and strongly indented at base, the 5 distinct sepals 2.5-3.0 mm long, broadly oblong, slightly boat-shaped, apically obtuse or rounded, green and inconspicuously 3-veined, with narrow, scarious, entire margins; petals 5, distinct, at early flowering forming a broad bell, becoming more wide-spread, the spreading blades mostly ca. 5 mm long, broadly oblong or obovate, apically rounded broadly or truncate, slightly if at all emarginate, erose, tapering at the wide-shaped base, white, mostly with 5 green main veins; stamens usually 10, distinct, spreading-ascending, the filaments linear-tapering, ca. 2.5-3.0 mm long, white, the anthers nearly round, the 2, pale-yellow, reniform anther sacs ca. 0.4 mm long; ovary at anthesis broadly ovoid, ca. 1.5 mm long, pale yellow-green, its apex strongly indented, the styles 3-4, distinct, at anthesis 1.0-1.2 mm long, erect or slightly spreading, the linear, excurved, minutely clavate-hairy stigmas ca. 0.5 mm long.

Fruit: Capsule broadly ovoid, enclosed by the persisting, erect calyx and withering petals, 3.0-3.5 mm long, dehiscing to 3-4 pale-brown, thin but firm valves, these narrowed at apex, there thickened, rounded, slightly incurved; seeds numerous, the funicles all from a short columnella, tear-shaped, turgid (swollen), with an indentation medially at middle of coiled embryo, 0.5-0.7 mm long, the seed coat reddish-brown, reticulate, the network a strong system of irregular, wavy ridges.

Distribution and Flowering Season:

Shaded sandrock ledges and bluffs, northern Cumberlands of Tennessee in 4 counties (Fentress, Morgan, Pickett, Scott); flowering mostly from early July through August.

Special Identifying Features:

A. cumberlandensis most resembles A. groenlandica, a sandwort of more northern latitudes or at higher elevations of the southern Appalachians, or extremes of A. glabra, a common spring flowering species of granite and sandrock glades in the Carolinas, Georgia, Alabama and Tennessee. However, it may be distinguished from either of these by its longer, broader, thinner, veinier leaves, leafier upper stems, which produce fewer flowers as a rule, and by its distinctive seed sculpture. Also the flowering time of A. cumberlandensis is summer, which means that it overlaps not at all with A. glabra or any other Arenaria of the complex except A. groenlandica. In the case of the last, a plant of full sun in high southern mountains, there is a distinctive difference in habitat, with A. cumberlandensis being found only in shaded sites. A. glabra, while a similarly delicate plant of full sun, is a true annual.

Habitat and Management Implication:

As noted above, A. cumberlandensis is a plant of moist sandstone ledges and overhangs, is referred to as a "rockhouse" plant. The substrate is a thin, moist layer of nearly pure sand on which are many bryophytes, several rock ferns and fern allies, including Selaginella apus, Lycopodium porophyllum, L. lucidulum, Dryopteris, Adiantum, Cystopteris, Asplenium montanum, A. trichomanes, etc. Herbaceous flowering plant associates of particular and consistent note are Parietaria pensylvanica, Boehmeria cylindrica, Pilea pumila, Silene rotundifolia, Thalictrum clavatum, Cardamine pensylvanica, Eupatorium (Ageratina type), Agrostis, Panicum, many Carex. The moist ravines and creekbanks support a rich forest cover. White pine and Canada Hemlock dominate the gymnosperms, the hardwoods comprise a rich mixed mesophytic assemblage typical of Appalachian cove forest, with an understory of Cornus, Rhododendron maximum, Clethra acuminata, Ilex, and highbush blueberries such as Vaccinium erythrocarpon, V. constablei, etc. The upper ravine slopes and ridges support a very different forest, namely oak-hickory pine, the White Pine with a strong admixture of Pinus virginiana, P. echinata, and understory woody plants such as Oxydendrum, Cornus florida, Sassafras underlain by lowbush Vaccinium, Gaylussacia brachycera, G. frondosa, Epigaea, Gaultheria, dewberry. The Arenaria does not come up into these drier sites or even to the higher ledges of the ravines where conditions are drier, lighter; instead it is confined to sites where the microclimate is cool, deeply shaded, more humid.

The primary danger to such habitat as this is from logging of ravine and bluff woodlands, which would admit too much light, therefore heating and drying the substrate, as well as subjecting it to erosion. In area I have seen where such clearings have been made, A. cumberlandensis is not in evidence, though it persists along the same drainages where such logging has not taken place. Populations within Pickett State Park, where most of the plants have been collected and observed, have sustained some damage in that some of the more spectacular ravines have had trails constructed into them, thus some bluff ledges have been impacted by hikers who wander off marked trails.

References:

- Wofford, B.E. & R. Kral. 1979. A new Arenaria (Caryophyllaceae) from the Cumberlands of Tennessee. Brittonia 31 (2): 275-260.

SPECIES: Arenaria cumberlandensis Wofford & Kral

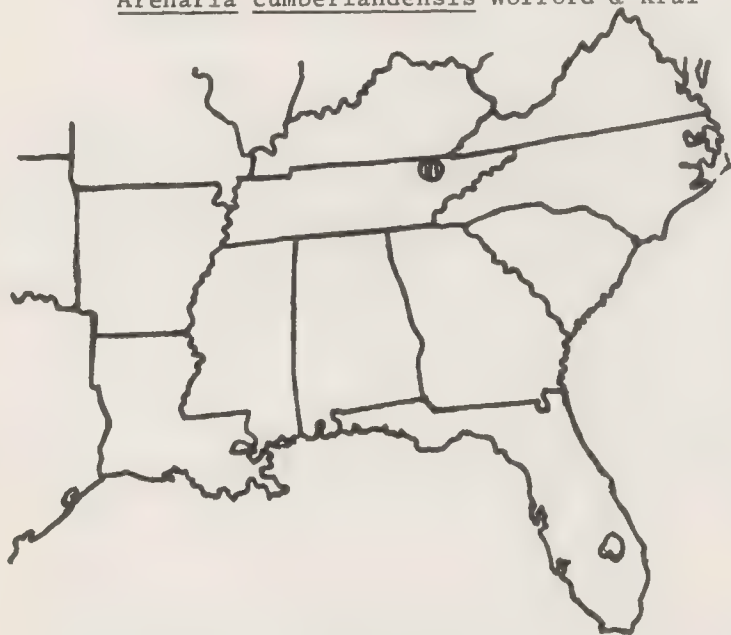
Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy	X				X	X		
Damage		NA	NA	NA			NA	
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Range of:

Arenaria cumberlandensis Wofford & Kral



245
CARYOPHYLLACEAE

- Arenaria fontinalis (Short and Peter) Shinnars, pioneer
sandwort, Sandwort
Sagina fontinalis Short and Peter
Stellaria fontinalis (Short and Peter) B. L. Robins
Alsine fontinalis (Short and Peter) Britton

Technical Description

Slender but stiffish smooth annuals with shallow, diffuse flimsy roots.
Stems.--Up to 1.5 dm long, mostly much shorter, several erect or spreading from the base, terete or with narrow wings decurrent from leaf bases.

Leave.-- Opposite from overwintering tufts, the cauline narrowly oblanceolate or linear, spreading, mostly 1.0-1.5 cm long, acute, entire with thinnish margins, attenuate to slightly clasping bases, pale yellowish-green.

Inflorescence.--Basically but asymmetrically cymose, the stems branching from near the base, each branch bearing at its axil a long-stalked symmetrical flower. Flower stalks 5-10 mm long in flower, elongating to 2 cm or more in fruit, smooth, slender, somewhat ribbed or angulate.

Flowers.--Sepals 4-5, erect in bloom, narrowly ovate-triangular, thin, about 2.5 mm long, pale yellow-green with very broad thin entire margins, apically mucronate and acute, 3-nerved. Petals absent or vestigial. Stamens as many as 10 but usually around 4-5, shorter than the sepals. Ovary superior, the styles 3-4 the placentation free-central with several ovules.

Fruit.--Capsule 3.0-35 mm long ovoid, its tip projecting above the perianth, at maturity splitting into 3 valves. Seeds nearly round or round and unevenly compressed in places, nearly 1 mm. broad, covered with tiny papillae, a dark lustrous reddish-brown.

Distribution and Flowering Season

Seeps over limestone or in calcareous soil, known only from the Interior Low Plateau near Lexington, Kentucky and middle Tennessee. Flowering in April and May.

Habitats and Management Implication

This rare species is known only from permanently wet areas, usually seeps and seepage areas around limestone outcrops or bluffs. It is in clearings in or in light shade of calciphilic hardwood species such as Maclura pomifera, Quercus muhlenbergii, Q. shumardii, Ulmus serotina, U. rubra, Acer saccharum, Carya caroliniae-septentrionalis, gymnosperms such as Juniperus virginiana. Common shrubs of such areas are Rhus aromatica, Rhus glabra, Rhamnus caroliniana, Symphoricarpos.

In the seeps this plant may dominate small wet areas with mats of growth, these mats interspersed with other herbs such as Cyperus, Eleocharis (particularly E. compressa, E. obtusa), Agrostis stolonifera, Gratiola neglecta. By late May the Arenaria begins to die back and by early June the plants are not in evidence.

Best growth of the species is in full sun or light shade. Logging of contiguous hardwoods where local seeps occur would probably favor increase; however, the topography is such and the site quality of such areas is such, that good merchantable species are few. The main enemy this plant has is drainage in that permanently wet substrates are required for its maintenance.

References

Gleason, H. A. 1958. Illustrated Flora, Vol. II, pp. 123-126.

Small, J. K. 1933. Manual of the southeastern flora, pp. 497-498.

Shinners, L. H. 1962. New names in Arenaria (Caryophyllaceae).
Sida 1 (1): 49-52.

SPECIES: #19 Arenaria fontinalis (Short and Peter : Shinnery, Sandwort

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage							X	X
No Lasting Effect	NA							
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Arenaria fontinalis (Short & Peter) Shinnars



245
CARYOPHYLLACEAE!

100
Arenaria godfreyi Shinnery, Godfrey's sandwort

1-7.
Stellaria paludicola Fern. & Schub.

Technical Description

Short lived perennial or winter annual from a shallow, flimsy, diffuse-fibrous root, producing mats of slender, prostrate, creeping or ascending wintering stems that root at lower nodes.

Stems.--Primary stems erect or ascending, decumbent-based, softish, 1-3 dm high, arising from axils of wintering stems, simple or sparingly branched toward base, ca. 1 mm thick, sharply longitudinally ribbed, also grooved, pale green, smooth save at the thickened nodes where sparsely puberulent with capitate pale hairs.

Leaves.--Opposite, estipulate, those of winter shoots glabrous, mostly 1.5 cm long or less, distinctly petiolate, the petioles troughed above, clasping based, with blades spatulate, oblanceolate or elliptic, acute, entire, yellowing as floriferous shoots flower; leaves of main stems spreading to erect, at mid-stem and above rather distant and progressively more sessile, linear-oblanceolate, linear or linear-spathulate, 1.5-3.0 cm long, acute with tips somewhat callused, margins entire, surfaces pale green, smooth save toward clasping bases and along the single evident vein beneath, there with pale, weak capitate hairs; upper leaves subtending lower inflorescence branches somewhat reduced, grading abruptly or gradually into short, oblong-linear bracteal leaves.

Inflorescence.--A terminal, compound, open diffuse cyme, the pedicels slender, glandular pilosulous at least basally and apically, the central or lower ones longest, 1-4 cm long, exceeded only by main or lateral branches.

Flowers.--Regular, perfect; sepals 5, distinct, erect, lance-oblong, ca. 4 mm long, pale green, apically rounded-apiculate, the apiculus purplish, marginally entire, pale-scarious, the bases bowed outward, glandular-puberulent externally, the outer surfaces distinctly triple-nerved, the ribs puberulent proximally; petals 5, distinct, spreading toward apex, oblong-spatulate, 10-12 mm long, white, the broadly rounded tips shallowly notched; stamens 8-10, ascending, the filaments slender, white, flattened and dilating proximally, 5-8 mm long, the anthers basifixed, bilocular, broad-oblong, ca. 0.7-1.0 mm long, yellow-green or pinkish; ovary smooth, ovoid or ellipsoidal, ca. 3.5 mm long, thin walled with a thicker concave (umbilicate) apex, the styles 3, distinct, linear, ca. 2.5 mm long, papillose-stigmatic from middle to slightly dilated tip; placentation free-central.

Fruit.--Ovoid, ca. 4 mm long, lustrous, green, later pale brown, umbilicate, the 3 valve tips hard-margined, truncate; seeds nearly round, ca. 0.8 mm wide but laterally slightly flattened, dark red-brown, the surfaces muriculate, with tubercle tips round-dilated and minutely papillate.

Distribution and Flowering Season

Full sun or light shade of springy creekbanks, seeps, meadows, and shores, usually over calcareous rock, Valley and Ridge of Virginia and Tennessee, Coastal Plain of the Carolinas, northern peninsular Florida, Alabama, Arkansas (Louisiana?); flowering from March into May.

Special Identifying Features

This taxon, once described as a Stellaria by Fernald and Schubert, with its lineal leaves, ribbed sepals, and conspicuous, white, apically shallowly notched petals, is superficially nearest to the calciphilic A. patula Michx. of limestone barrens of the inner Coastal Plain, Interior Low Plateau and various other central physiographic provinces in the east or mid-west, or to A. muriculata Maguire of seeps and wet meadows west of the Mississippi in Missouri, Arkansas, Oklahoma, Louisiana. A. godfreyi is particularly to be distinguished by the stipitate-glandular pubescence of its nodes, leaf bases, pedicels and sepals, together with the unique character of its seed papillae, these being rounded-dilated apically and there minutely granular-papillose (unlike those of A. muriculata, which are simply tubercle-like and not dilated-papillose apically).

Habitat and Management Implications

A. godfreyi frequents permanently moist to wet, springy banks of springs and streams, seep slopes or wet grassy swales, usually in full sun, sometimes in light shade. It has a wide, scattered distribution, thus is found in a variety of forest systems. In the type locality area it is usually along small streams that course through slash pine-saw palmetto, through titi, or through low hammock composed of mixed hardwoods, slash and loblolly pine, and cabbage palmetto. The underlying rock is limestone. In the Valley and Ridge Virginia locality it is in seeps over calcareous shale, the surrounding forest being a mixture of upland yellow pines, with various upland hardwoods along and around the seeps. In the Coastal Plain of the Carolinas it is found on seeps over marl in lowland hardwood-pine complexes. In southern Arkansas it is on moist tuffaceous sand in old shallow lake bed, situated in swamp hardwood-loblolly pine-palmetto, and is largely fire-maintained. In Alabama it is known thus far only from a limited area of wet grassy meadow that was cleared from swamp hardwoods, and has marl underlying.

Requirements of the species appear uniformly to be a substratum that is kept permanently moist, but not inundated for long, full sunlight or at most light shade, and a substratum that is fertile, usually basic. In Taylor County Florida, where plants appear to be most abundant, much of the low land has been cleared of hardwoods and residual lowland pine and has then been planted to slash pine. This has had to produce a negative effect on the Arenaria in that soil disturbance along the shallow streams is often extreme, much altering the drainage pattern. Also a more uniform overstory and a heavier shade is created, which has eliminated fine habitat for this plant of sun. The best patches of it now appear in ditches along main and access roads, usually in the vicinity of culverts through which the small streams flow. It would probably be best for this species were forest managed without artificial drainage or any mechanical manipulation of the seep soils. Windthrow of overstory species, fires during drier cycles, were doubtless historical factors in providing suitable habitat.

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Shinners, L. H. 1962. New names in Arenaria (Caryophyllaceae). Sida I: 49-52.

Wofford, B. E. 1981. External seed morphology of Arenaria (Caryophyllaceae) of the southeastern United States. Systematic Botany 6 (2): 126-135.

SPECIES Arenaria godfreyi Shinn. Godfrey's sandwort

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	X
Damage								
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Arenaria godfreyi Shinnery



Geocarpon minimum K.K. Mackenzie [1-4]

Status: Endangered

Technical Description:

Diminutive, smooth, ephemeral annual from a small, slender taproot.

Stems: simple or branching only at very base, the branches few, at most 4, erect or spreading-ascending, mostly 3-4 cm high, less than 0.5 mm thick, terete, greenish-brown or strongly suffused with red, the few lowermost nodes close-set, above this to around 1 cm apart, each node floriferous, the internodes zig-zag.
Leaves: opposite, the lowermost pairs narrowly oblong, to 3-4 mm long, their bases connate-sheathing, the margins entire, somewhat involute, the apices acute; bracteal leaves triangular-connate, keeled, 2.5-3.5 mm long, acute, strongly red or purple-tinged.
Flowers: usually 1/node and alternate, subsessile, erect, 3-4 mm long, bisexual, regular, funnel-form-campanulate; sepals 5, 3-4 mm long, reddish or reddish-green, joined half their length, the subequal lobes triangular-ovate, nearly erect or slightly spreading, acute, scarious margined, the lobe bases slightly overlapping, the backs each with 1 strong median nerve and a pair of fainter laterals; petals absent; stamens 5, the slender but flattish-based filaments arising just below the sepal lobe sinuses, terminating in minute, bilocular, subglobose anthers; staminodes 5, rudimentary, scale-like, arising alternately at level of the filament bases; ovary superior, lance-ovoid, somewhat trigonous, about the length of the sepals, greenish, the narrow apex at anthesis 3-lobed, minutely glandular-toothed or retuse, the style lacking, the stigmas minute, recurved, arising subapically at the sinuses of the apical ovary lobes.
Fruit: Capsule not much longer than the ovary, splitting along the 3 wirelike valve margins about halfway down the fruit from the apex to expose the numerous, long-funicular seed; seeds yellowish-green, translucent, ovoid to nearly round, ca. 0.5 mm long, the rounded backs muriculate (minutely pebbled), the sides minutely and narrowly striate-cancellate.

Distribution and Flowering Season:

Fine sandy silty substrates, moist exposures of soil, mostly over siliceous rock in glades, very infrequent, southwestern Missouri and in two counties in southern Arkansas; flowering from March through April.

Special Identifying Features:

Geocarpon is monotypic. K.K. Mackenzie, who described it (1914) from Missouri material collected by E.J. Palmer opined that it belongs to the tribe Aizoideae of the Aizoaceae. Later (1950) E.J. Palmer and J.A. Steyermark wrote an elaborative paper in which G. minimum was placed instead in the Caryophyllaceae in that, to be where Mackenzie placed it, it would have to have stipules and a different fruit dehiscence (circumsessile rather than longitudinal). On the other hand, many Caryophyllaceae do lack stipules, may (contrary to the earlier opinion of Mackenzie) have a gamosepalous calyx, often tend to have the same reduction series from 10 to 5 stamens, and

all provide a 1-locular ovary with a free-central placentation. Thus, the final disposition of Geocarpon has been to place it near Scleranthus in between subtribe Sabulininae of tribe Alsineae and the Scleranthaeae, family Caryophyllaceae.

Habitat and Management Implication:

Steyermark, who found most of the Missouri stations for this rare plant, noted that the habitat for it was primarily sandstone glades, where ledges of fine sandstone, interbedded with shale, are exposed along small streams, where a thin layer of humified silty sandy accumulates and appears to be held in an early successional stasis. Surrounding area where deeper soils allow, is savanna, with Andropogon, Panicum scoparium, Setaria, Rhynchospora, Scleria, Fimbristylis, Carices, Tradescantia, Anemone caroliniana, Rubus, Baptisia leucophaea, Centunculus, Castilleja, Rhexia, Cirsium, this primarily grass-sedge landscape dotted with hardwoods such as Diospyros.

The Arkansas localities, close together along the Bradley-Drew County line, are floristically different in some regards. First the sites are, as in Missouri, small areas of mineral earth, in this case small, level openings in grass-sedge on Late (Bonn) soils. This soil is a tuffaceous sand, yellowish or yellowish-reddish-brown with iron oxides, and the areas are what at one time were beds of shallow lakes. Low points are very wet, forested with cypress-tupelo interspersed with Red Maple, Carolina Ash, Hackberry, Green Ash, Swamp Privet and lowland oaks, the shallower arms of the old bed dominated by a grass-sedge formation similar in makeup to that described by Steyermark (Andropogon, Panicum, Rhynchospora, Scleria, Carex, often the same species), but this landscape dotted with Sabal minor which gives it a much different look. The rises, which were probably once shores and islands are forested by upland oaks, hickories, hackberry, White Ash, Loblolly Pine, with both high and lowbush blueberries, Rubus, Smilax, Cornus, Crataegus. Here and there in the grass-sedge formation are small open exposures of Late soil, these on frequent occasions washed by high waters during wet periods but not for long periods of time, often lichen-encrusted, and during the time of flowering of Geocarpon populated thinly by Houstonia minima, Plantago pusilla, Hypoxis hirsuta, Cerastium, Viola rafinesquii, Oenothera linifolia, Krigia, etc. Isoetes melanopoda appears in small patches, together with some dichanthelium Panicum, Agrostis elliotii, A. hyemalis, Nothoscordium and the grass-sedge environs often have large patches of the rather rare Schoenolirion wrightii Sherman, another endangered species.

Some of this old lake bed has been cultivated in the past and some is presently pastured, but the site is of low agricultural quality. The area left as it is will continue to support good populations of Geocarpon. The poor and acid substrates continue to erode to expose new patches of mineral siliceous earth on which succession appears to be slow. There is also considerable evidence that fire was a factor in keeping this savanna, and this, if included in management of the tract would act to reduce woody invaders as well as to provide impetus to the erosional forces creating bare patches for the Geocarpon and other shallow-rooted herbs of full sun.

On the other hand, a more intense pasturing would be very destructive, as would any conversion to row planted pine (for which the site is poor!)

References:

Mackenzie, K.K. 1914. A new genus from Missouri. *Torrey* 14: 67-68.

Palmer, E.J. & J.A. Steyermark. 1950. Notes on Geocarpon minimum Mackenzie. *Bull. Torr. Bot. Club* 77 (4): 268-273.

Steyermark, J.A. 1958. Another station for Geocarpon minimum. *Bull. Torr. Bot. Club* 85 (2): 124-127.

SPECIES: Geocarpon minimum Mackenzie

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X	X	X			X	X
Damage								
No Lasting Effect					X	X		
Beneficial if Done Properly	X							

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Geocarpon minimum Mackenzie



245 CARYOPHYLLACEAE:)

✓ Paronychia chartacea Fernald, Paper-like nail-wort

Nyachia pulvinata Small [1-2]

Technical Description

Low, annual, forming round mats of many branches radiating flatly from a strong taproot.

Stems: Shoots forking repeatedly from near the base, roundish, smooth, greenish, the internodes short, and with a broad band or two of reflexed pale hairs on the larger branches.

Leaves: Opposite, the lowest largest, ovate or oblong, rarely longer than 3 mm., blunt, entire, smooth, fleshy, strongly rolled (revolute), the bases sessile and somewhat auricled; leaf pairs grading gradually into narrower, shorter, bracts; all leaves stipulate, each stipule of a pair consisting of a brownish, somewhat swollen base, and terminating in an acutely jagged erect scale.

Inflorescence: Flowers regular, many, solitary or in clusters of 3, sessile, each subtended by a pair of fleshy oblong bracts, the whole inflorescence a compound system of cymes.

Flowers: Calyx of 5, erect or slightly spreading, oblong, yellow-green, cupped sepals less than 1 mm. long, each bearing on its convex outer surface toward the truncated tip a low-conic spur, the whole flower appearing obovate and truncate; sepal bases low-hairy. Petals 0. Stamens 5, opposite the sepals, each filament arising from a scale at a sepal base, the narrowly oblong anthers resting in the cup formed by the sepal apex. Ovary ovoid, slightly shorter than the sepals, the styles 2, shorter than the ovary but with stigma tips projecting slightly beyond the sepal tips.

Fruit: A very thin-walled obovoid utricle, the single seed ovoid, dark reddish-brown.

Distribution and Flowering Season

This whitlow-wort is found only in the sand scrub of ancient dunes in the lake region of southern peninsular Florida where it blooms and fruits from spring through fall.

Special Identifying Features

P. chartacea is part of that group of Paronychia which has the free portion of the sepals longer than the fused portion, and is further distinguished by its short styles, the bluntly conic sepal umbos (spurs) and its strongly revolute, fleshy leaves. It has the tiniest flowers of its group in the southeastern U.S.

Habitats and Management Implication

Paronychia chartacea, together with other sand stabilizers is found in the pure, white sand clearings or "blowouts" in the sandscrub. Where the scrub is removed

for the purpose of orange groves this plant does not usually occur. However, where fire lanes or roads are made, these revealing bare sands, the plants abound, just as they do where the scrub and orange groves meet. The species is definitely part of the lowest successional stages in the sandscrub, giving way when tall herbs, later shrubs take over. It is endangered primarily because of loss of habitat through orange groves and housing developments. Removal of the overstory through clear-cutting or fire, sufficient to create bare sand areas would tend to maintain this species, but "clean" orange groves develop another sort of weed flora with which this seems unable to compete.

References

- Fernald, M. L. 1936. Plants from the outer coastal plain. *Rhodora* 38: 414-452.
- Small, J. K. 1933. *Manual of the Southeastern Flora*, pp. 481.

Revised March 1980

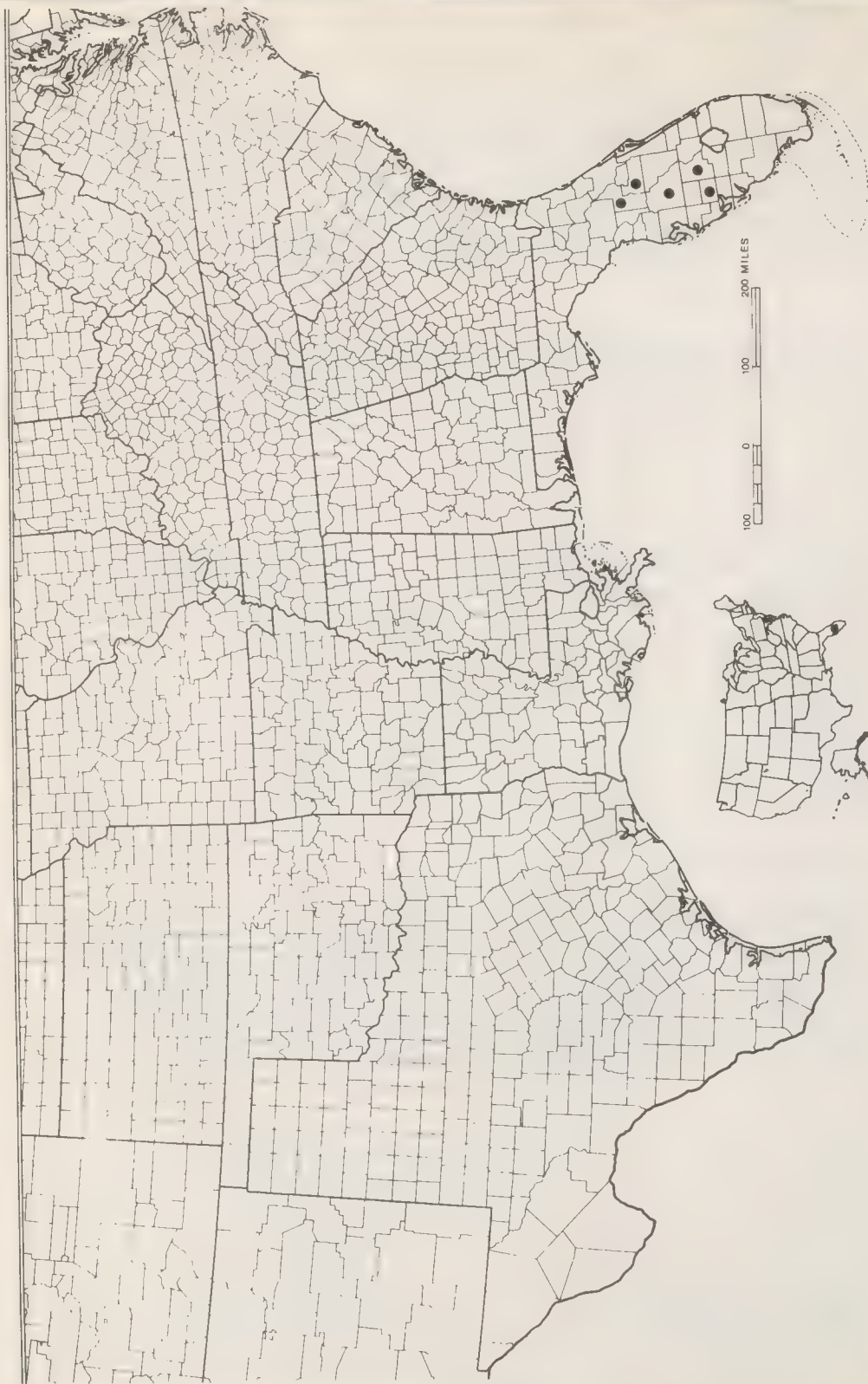
SPECIES: #74 Paronychia chartacea Fernald. Paper-like nail-wort

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy				X			X	
Damage								
No Lasting Effect			NA					?
Beneficial if Done Properly	X	X			X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980



MAP 74. *PARONYCHIA CHARTACEA*

245
CARYOPHYLLACEAE

100
→ Silene polypetala (Walt.) Fern. & Schub. ^{fringed campion}
S. baldwinii Nutt.

Technical Description

Stems.--Perennial, the one to several shoots erect or ascending, to 4 dm, simple or sparingly branched, soft, and with soft, long hairs, reproducing vegetatively by long, slender stolon-like rhizomes and lax, leafy offshoots, both terminating in overwintering rosettes.
Leaves.--Rosette and lower stem leaves spatulate, 3-9 cm long, soft, spreading, pale-green, the tips rounded, sometimes with a short mucro, the margins entire, the bases long-attenuated, the petiole thus winged, the surfaces with soft, pale spreading hairs along the margin and midrib beneath. Leaves progressively shorter up the stem, opposite, becoming elliptic, oblong or lanceolate, with rounded, even clasping bases.
Inflorescence.--Flowers few, 3-5 on slender, hairy, erect or slightly spreading stalks in a terminal cyme, sometimes with another, fewer-flowered cyme on the next lower node.
Flowers.--Calyx tubular, 2-3 cm long, with long, weak, clammy hairs, the calyx lobes 5, narrowly triangular 7-9 mm long, erect. Petals distinct, 5, the claws about as long as the calyx, the blades spreading, subequal, 3-4 cm long, obdeltoid, the truncate apex divided into slender segments (fimbriate), the whole petal a coral pink, or white. Stamens 10, not much longer than the petal claws. Ovary superior, styles 3-5, distinct, slender; placentation free-central.
Fruit.--An ovoid, many-seeded, capsule 7-9 mm long, thus hidden in the persistent calyx.

Distribution and Flowering Season

This rare and showy species is found in rich woods in the Piedmont and Coastal Plain of Georgia, and contiguous northern Florida. It blooms from late March through April.

Habitat and Management Implication

S. polypetala is found on well drained loamy (usually sandy-loam) soils under hardwoods. This definitely woodland species, being dependent on the rich, humified loams engendered by the litter of a mostly deciduous overstory, would react adversely to heavy logging or any site manipulation that would admit much insolation or depletion of the humus. Conversion of hardwood to pure pine overstory would eliminate the species. Many early spring flowering herbs are interesting in that they are light-dependent during their early period of bolting and flowering, shade-dependent later during their periods of fruiting and dormancy. They can have such conditions only under mixed deciduous, old, forest.

Suggested Reading

Fernald, M. L. & B. G. Schubert, 1948. Studies of American types in British herbaria. *Rhodora* 50:181-208

Small, J. K. 1933. Manual of the Southeastern Flora. The University of North Carolina Press. 505-507.

Revised March 1980

SPECIES: #126 Silene polypetala (Walt.) Fern. & Schub.; fringed campion

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy						X	?	
Damage	NA	NA	NA	NA				X
No lasting effect								
Beneficial if done properly					X			

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Silene polypetala (Walt.) Fern. & Schub.



245
NYMPHACEAE;

- Nuphar luteum (L.) Sibth. & Sm. ssp. ulvaceum (Miller & Standl.) Beal West Florida cowlily
Nymphaea ulvacea Miller & Standl.
Nuphar ulvaceum (Miller & Standl.) Standl.

Technical Description

Coarse, smooth, aquatic perennial, the leaves arising directly from a stout, submersed, shallowly set, elongate rhizome to 5 cm thick.

Leaves.--Alternate, on variously elongate (depending on water depth) terete, spongy, green petioles to 1 meter long (usually less); submersed blades thin, the entire margins strongly undulate-crispate, often tinged with red; floating leaves similar to submersed ones but thicker, deeper green, flat, lance-ovate to lance-oblong, mostly 2-4 dm long, the tips narrowly rounded, the margin entire, the auriculate base with lobes overlapping or closing the narrow sinus, this less than 1/5 the blade length; upper leaf surface lustrous, deeper green than the duller lower surface.

Flowers.--Solitary at tips of fleshy bractless peduncles that arise directly from the rhizome and are similar in length and shape to petioles of subtending leaves, regular, perfect, subglobose, ca. 2.5 cm high, 3.5-4.0 cm broad; sepals 6 in 2 apparent series, the outer 3 erect, broadly oblong, cupuliform, green, ca. 3 cm long, the tips broadly rounded, the base abruptly constricted at the receptacle; inner sepals clear yellow, thinner, rounded-obovate, short-clawed, cupping the center of the flower; stamens numerous, incurved-overlapping in 4-5 flat spirals, yellow, the flattened filaments shorter than the linear upright anthers; ovary superior, at anthesis ca. 2 cm high, the many carpels fused into a broadly ovoid-globose body, this constricted just below the apex, then abruptly dilated, forming a concave disc, 1.2-1.5 cm broad, the numerous narrowly elliptical stigmatic lines radiating spokelike from the center.

Fruit.--A green, subglobose, spongy berry ca. 2.5 cm high, the apex truncated by a persistent stigmatic disc, the numerous seeds imbedded in spongy placental tissue, round, ca. 4 mm broad, smooth, pale brown.

Distribution and Flowering Season

Swiftly to slowly flowing shallows of streams, northwestern Florida, Chipola system westward; flowering intermittently from May to frost.

Special Identifying Features

This subspecies (according to Beal all are subspecies of N. ulvaceum!) is, in its narrow floating leaves, most similar to ssp. sagittifolia.

a taxon of the Atlantic Coastal Plain, but tends to have broader foliage. It is also supposed to be distinguished from it by the pattern of its stigmatic rays (lines) which is narrowly elliptic (rather than linear). Differences between these subspecies are best consulted on plants which are in normal depths and currents of water, the narrower leaved ones appearing it seems where currents are swiftest. When specimens of *N. luteum* ssp. *ulvaceum* are exposed, as when the river level drops for long periods, the leaves become much shorter-petioled, with blades having much lower length/width ratios. On the other hand, submersed leaves also tend to have blades with lower length/width ratios.

Habitat and Management Implications

N. luteum ulvaceum has its rhizomes shallow embedded in the sands or silty sands of bottoms and shallows of swift flowing, clear or tannic-acid-tinted streams. Here it may be associated with various *Potamogeton*, *Najas*, *Sparganium*, *Scirpus* (such as *S. etuberculatus*), *Sagittaria*, etc. At low river stages it may be exposed or in very shallow water and reacts to produce much different looking plants (see previous section!) The bank forests are typical of bottoms in the region, containing a mixture of *Platanus*, *Forestiera*, *Ulmus*, *Salix*, willow oaks, Sycamore, *Carva aquatica*, *Nyssa*, *Taxodium*, *Acer rubrum*, etc. Much of this timber is valuable and considerable acerages of bottomland forest in the range of this *Nuphar* have been cut over. The threat to the *Nuphar* is predictable; clearcutting of the hardwoods alters the drainage pattern, promotes excessive flooding, excessive sedimentation, reduces water quality and clarity, all negative factors for this plant. Single tree or groups selection, providing the logging is done with minimal disturbance to the substrate, probably has the least effect.

References

- Beal, O. E. 1956. A taxonomic revision of the genus *Nuphar* Sm. of North America and Europe. Journ. Elisha Mitchell Sci. Soc. 72: 317-346.
- Fernald, M. L. 1942. Additions to the flora of Virginia. Rhodora 44: 396-397.
- Miller, G. S. & P. C. Standley. 1912. The north American species of *Nymphaea*. Contr. U. S. Nat. Herb. 16 (3): 63-108.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 540-542. Chapel Hill, N. C.

SPECIES Nuphar lutea (L.) Sibth. ssp. ulvaceum (Miller & Standl.)

Beal. West Florida cowlily

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	X*	X*	X*		X	NA	
Damage								X
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments: * referring to adjacent bottoms

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Nuphar luteum (L.) Sibth. & Sm. ssp. ulvaceum (Miller
& Standl.) Beal



245
RANUNCULACEAE

100
Aquilegia canadensis L. var. australis (Small) Munz [1-3]
A. australis Small southern columbine

Technical Description

Perennial herb from a stout caudex.

Stems.-- Erect, usually solitary, slender, 3-10 dm tall, terete, sparsely pilose or nearly glabrous, pale yellowish-green, branching only in the inflorescence.

Leaves.-- Rosette leaves numerous, mostly 1-3 dm long, 2/3 petiole, these slender, ascending or spreading from abruptly dilated, scarious-margined, clasping bases, terete, pale green or tan, sometimes maroon-tinted, pilose, the blades broadly ovate or triangular, 2-3-ternately compound, the leaflets reniform to suborbicular or obovate, 1.5-3.0 cm long, usually deeply 3-cleft-and-lobed, the lobes 2-3-rounded-lobed at tips, the margins usually entire, the bases cuneate to rounded or truncate, with the lateral leaflets generally inequilateral; upper surfaces dark yellow green, lower surfaces glaucous; stem leaves progressively shorter-petioled and more distant upward on stems, grading into 3-lobed, simple, bracteal leaves.

Inflorescence.-- An open panicate compound of cymes, the long-peduncled branches ascending from all or most upper (bracteal) leaves: flowers nodding.

Flowers.-- Regular, bisexual; sepals 5, distinct, erect, lanceolate or ovate-lanceolate, 1.2-1.5 cm long, acute, entire, rounded-cordate, reddish with green tips; petals 5, distinct, 3-4 cm long, each for most of its length joined into a narrowly conical-tubular spur, the open end ca. 6-7 mm across, flaring obliquely, yellowish, the tubular part reddish, gradually then abruptly narrowed, then broadening at its tip into a small, nectar-filled bulb, with all spurs directed backward (upward) on the inverted flower; stamens numerous, the pale slender filaments flattened and somewhat dilated proximally, projecting the yellow, basifixed, oblong, 1.5 mm long, anthers well beyond the perianth tips; carpels 5, erect, lance-linear, distinct, weakly pilose, the styles linear, 1.0-1.5 cm long.

Fruit.-- Follicles erect, lance-cylindrical, 1.5-2.0 cm long, glabrescent, the acuminate tips but slightly spreading.

Distribution and Flowering Time

Calcareous bluffs and outcrops, northwestern Florida; flowering in March and April.

Special Identifying Features

This variety is distinguished from the wide-spread north American type variety by a combination of more glaucous foliage, somewhat larger flowers with the sepals narrower and slightly longer, the spurs stouter, and follicle tips less spreading. The type locality is in the calcareous outcrop areas at

Mariana, Florida, a considerable disjunction from the area of A. canadensis var. canadensis. Munz (1946) treats Texas material named A. australis by Small (1898) as part of another variety (latiuscula (Greene) Munz) which is a lower plant with narrower spurs. A problem in identification and rank of these taxa still exists in that specimens of A. canadensis var. canadensis show such a wide range of variation as to include most, if not all, the characters used by Munz (l.c.) for the other varieties.

Habitat and Management Implications

A. canadensis australis grows in the shallow soil mantles of ledges of or in crevices in limestone of Oligocene age in the area of Mariana, Jackson County Florida. Particularly fine examples of it are to be found on shaded limestone outcrops along the Chipola River in Mariana Caverns State Park, these usually in association with such herbaceous genera as Trillium, Sanguinaria, Isopyrum, Lithospermum (tuberosum), Senecio (obovatus), Phlox (divaricata), etc. in light to dense shade of mixed mesophytic forest characterized by mixed oaks, hichories, ash, maple and elm. Normally it is rooted in a humified sand. The only cutting of overstory that should be recommended for this type would be selective in that clearcutting would admit intolerable amounts of light and heat. Opening such woodlands to grazing would have a negative effect more through trampling of plants and physical damage to the thin soils than from an actual use by livestock.

References

- Munz, P.A. 1946. Aquilegia, the cultivated and wild columbines. Gentes Herbarum VII (1): 1-150. Ithaca, NY.
- Small, J.K. 1898. Studies in the botany of the southeastern United States. Bull. Torr. Bot. Club 25: 466.
- _____. 1933. Manual of the southeastern flora, pp. 514. Chapel Hill, NC.

SPECIES Aquilegia canadensis L. var. australis (Small) Munz.

Southern columbine

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA		X	NA	
Damage								X
No Lasting Effect					*			
Beneficial if Done Properly					*			

Other Comments: *selection, group selection

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Aquilegia canadensis L. var. australis (Small) Munz



245
RANUNCULACEAE

Cimicifuga rubifolia Kearney, [F-2]
Appalachian bugbane; Bugbane

Technical Description

Tall, but rather slender perennial herb, to 1.5 meters, the single, erect or ascending shoot from a knotty, irregularly horizontal rhizome.
Stems.--Roundish in cross section, often maroon-tinted, usually smooth or with a villous-hairy line, usually unbranched and wand-like in flower.
Leaves.--Few, concentrated toward the stem-base, the petioles elongate, sheathing the stem-base, 3-branched, with each branch again 3-branched (ternate), the leaflets symmetrically or asymmetrically ovate to orbicular prominently 3-5 (-7) lobed (much as in Red Maple in size and outline) to 1.2 dm long on petiolules slightly shorter, the lobe tips acuminate, the margins coarsely and irregularly serrate, the bases usually cordate, the upper surfaces deep green, smooth, the lower surfaces paler, smooth or with some long, crisped hairs on the raised veins.
Inflorescence.--An elongate, terminal openly cylindrical raceme of whitish flowers, the axis puberulent.
Flowers.--Symmetrical; sepals 2-5, falling off when or shortly after the bud opens, ovate-suborbicular, yellowish-white, smooth, ciliate or entire. Petals absent. Stamens numerous, on a slightly elevated receptacle, the filaments white, filiform but slightly broadening upward, the anthers short, yellowish-white. Carpels no more than 2, sessile on the receptacle.
Fruit.--Asymmetrically oblong, 8-10 mm long, somewhat flattened, veiny, the numerous small seeds chaffy, in 2, irregular rows.

Distribution and Flowering Season

This species occurs sporadically in the Ridge-and-Valley, Cumberland Plateau, and Highland Rim in northeastern Alabama, Tennessee, and Virginia. It flowers mostly in the early fall.

Special Identifying Features

Taxonomically it is closest to C. racemosa, in that it has no more than 2 carpels and its seeds are in more than one row. It is distinguished from that species by (a.) its much later flowering habit (C. racemosa flowers in early summer) (b.) its larger, broader, more lobed leaflets which are strongly cordate-based (c.) its shorter (-4 mm in contrast to 8 mm) filaments and (d.) its longer (8-10 mm in contrast to 5-7 mm) follicles.

Habitats and Management Implication

This rather rare species is found in rich, well-drained, loamy soils in open, mixed-mesophytic, forested slopes. Typically these are soils formed over limestones or calcareous shales and are moist, never wet,

such as would be found in the ravine slopes of streams and rivers within the region. In that such slopes are highly erodable, logging of the mixed species of hardwoods comprising the overstory must needs be selective. The plants, the roots of which are sometimes used medicinally, appear not to be grazed by livestock; rather they may suffer through trampling in woodlands where grazing by cattle is excessive. The steepness of large parts of the country where the species occurs probably renders much of their area difficult for cattle to graze. The major hazard to C. rubifolia, a plant of shade, is unquestionably clearcutting of the hardwood overstory, this invariably followed by heavy erosion and too much insolation.

References

Kearney, T. H., Jr. 1897. New or otherwise interesting plants of East Tennessee. Bull. Torr. Bot. Club 24: 560-575.

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SPECIES: #151 Cimicifuga rubifolia Kearney. Bugbane

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy						X		
Damage								
No Lasting Effect	NA			✓	X			
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.



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RANUNCULACEAE

Clematis addisonii Britt. Addison's leather-flower
Viorna addisonii (Britt.) Small

Technical Description

Perennial, semishrubby, glabrous vine from a stoutish short caudex.

Shoots.-- At first erect, by fruiting time often arching or leaning, usually single from the woody rootstock, brittle, terete, purplish and glaucous, either simple or branching from the middle and upper nodes.

Leaves.-- Opposite, the lowermost pairs very short, lineal to obovate, erect, the largest at mid-stem or above, mostly ovate, 8-12 (-15) cm long, 6-10 cm broad, acute to rounded or emarginate, rarely deeply retuse or bilobed, entire, narrowly revolute, the bases rounded, cordate, sometimes obliquely so, sessile or with very short, clasping based petioles, the upper surface deep green, obscurely palmately veined, the lower surface glaucous, noticeably reticulate; bracteal leaves of main axis indistinguishable from main shoot leaves in shape or size, those of later growth, particularly of side branches, much smaller, often divided into 1-2 pairs of leaflets, or these modified to tendrils.

Flowers.-- Regular, bisexual, usually nodding, arising singly or doubly from shoot tips or oppositely from axils of shoot and branch on spreading, bi-bracteate, purplish-glaucous peduncles, the pedicels 3-8 cm long, their tips recurved; sepals 4-5, valvate in the ovoid bud, later forming a campanulate calyx, distinct, thickish and leathery, lanceolate, ca. 2.5 mm long, the tips recurved and short-acuminate, the backs reddish-purple, smooth, parallel-veiny, the inner surface tomentose, densely so along the margin; stamens numerous, erect, ca. 2 cm long, the filaments pilose, linear, the anthers basifixed, linear, yellowish, 4.0-4.5 mm long, the connective and its protruding narrow tip pilose; carpels numerous, at anthesis reaching about to the level of the erect anthers, erect, the carpel body ovoid, 1-ovuled, densely sericeous-tomentose, the styles elongate, densely silky-hairy to stigma tip, the hairs yellowish-white, the stigmas short-linear.

Fruit.-- Ripe akene body laterally flattened, with a few slightly raised veins, in outline broadly ovate, ca. 6 mm long, 4-5 mm broad, short acuminate into the persistent style, brown with pale, appressed soft hairs, the style densely yellowish-plumose-hairy, fully 4 cm long, usually strongly spreading or recurved.

Distribution and Flowering Time

Rocky wooded bluffs and ravines or ledges, Valley and Ridge, southwestern Virginia; flowering from May into early July.

Special Identifying Features

This leather flower is the least viney of its complex, usually the shoots erect and fairly short by first flowering time, only later leaning, and often

producing no tendrils; typically the leaves are simple, mostly sessile, only those of lateral branches sometimes compound.

Habitat and Management Implications

C. addisonii is scattered on thin soils over limestone or dolomite, either on open outcrops or under light to moderate shade of mixed hardwood-Juniperus, the substrate moist to rather dry. The overstory when present is comprised of a mixture of Quercus, primarily Q. muhlenbergii, Q. rubra, Q. alba, hickories such as Carya ovalis, C. glabra, C. cordiformis, Juglans, Acer saccharum, Ulmus, Celtis, Fraxinus americana, etc. Juniperus virginiana is interspersed. The steep topography and highly erodable nature of the thin soils would suggest that logging of the overstory should be confined to single tree selection, if any is recommended at all on these difficult and sensitive areas.

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SPECIES Clematis addisonii Britt. Addison's leather-flower

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			X	
Damage	X					X		
No Lasting Effect								
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Clematis addisonii Britt.



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RANUNCULACEAE

17-37
~~*Clematis catesbyana* Pursh.~~ Old man's beard virgin bower
C. virginiana L. var. *catesbyana* (Pursh) Britton
C. micrantha Small?

Technical Description

Rambling, sprawling or climbing perennial, herbaceous vine, sometimes forming masses several meters high or broad.

Stems.--Lower stems with thin, dull-brown, exfoliating bark, distally strongly ribbed, often white-appressed-villosulous, the newer shoots and branchlets villous-tomentulose with whitish or yellowish hairs.

Leaves.--Main shoot leaves ternately-pinnately compound, alternate, estipulate, sometimes to 2 dm long, usually shorter, the spreading or ascending petiole 5-10 cm long, ribbed, reddish-brown or greenish brown, appressed villous, distally 3-branched, each branch toward apex with 3-5 (-7) mostly 3, leaflets, the largest terminal, reniform, suborbicular or ovate, 3-5 cm long, coarsely toothed, the tooth tips acuminate or cuspidate, often also prominently 2-3-lobed, the base rounded or cordate, the upper surface dark, dull green or yellowish-green, smooth to sparsely strigillose, more heavily so along the impressed main veins, the lower surface paler, sericeous or soft-puberulent.

Inflorescence.--Main axes and lateral shoots terminating in an elongated panicle of cymes, the lower nodes of which produce compound leaves similar to those of main shoots but smaller, more sessile and with fewer, smaller leaflets, these gradually reduced upward along the main axis and upward on the inflorescence branches to become smaller still, the blades simple or trilobate, tomentose; inflorescence branches cymose, 2-6-flowered, the spreading rays tomentose, bracteolate, or the flowers solitary at peduncle tips (toward inflorescence tip).

Flowers.--Regular, perfect, 1.0-1.3 cm broad across the spreading sepals; sepals elliptic to lanceolate or obovate, ca. 5-7 mm long, acute, both surfaces densely white-sericeous-tomentose, the backs often tinged with purple, or pink, or pale green; stamens numerous, erect or spreading, ca. 5-6 mm long, the filaments broadly linear, very flattened, broader than the short-linear, 1 mm long, erect, yellowish anthers or some not as broad and others dilated only distally, thus more spatulate; carpels many, distinct, appressed-hairy, the elongated erect styles strongly white-pilose save at the short-linear stigmatic apex.

Fruit.--Akenes ellipsoidal, 3.0-3.5 mm long, pubescent, the elongated styles silvery-spreading-pilose.

Distribution and Flowering Season

Fencerows, borders of high and low hammocks, waste places, western peninsular Florida and northwestern Florida; flowering August into September (the range given is for the entity *C. micrantha* Small;

that for C. catesbyana proper is much broader and is Coastal Plain from South Carolina south into Florida, west into Louisiana!)

Special Identifying Features

As Dr. Keener (1975) points out, C. micrantha appears simply to be a smaller-flowered variant of C. catesbyana, but has broader sepals and shorter stamens. Specimens called C. micrantha do appear to be few, with some geographic fidelity, thus the taxonomy may be undetermined. In such a case it is advisable to attempt to preserve a doubtful taxon at least until the facts are in.

Habitat and Management Implications

The habitat in Florida of the extreme named C. micrantha Small appears to be the sunny edges of high and low hammock, where the vines may form rambling, climbing patches. The hammocks of the Brooksville area (the type locality) overlie deep Eocene limestones and are characterized by Magnolia grandiflora, willow and water oaks, live oak, red maple, green ash, red bay, etc., sometimes with a scattering of loblolly pine (which reaches its southern extremes here), longleaf pine. Sabal palmetto is throughout. The country is typical karstland, with high hills of sandy loam or sandy silt loam overlying reddish sandy clays, often dotted with outcropping limestones, the highlands interrupted by sinkholes, sinkhole lakes and ponds, or extensive bottoms. The Clematis grows along the edges of forest, in brushy cleared areas, or in places where the underlying limestone forms local outcrops (this last is particularly the case in the Mariana area of northwest Florida). The vines are never in dense shade, nor are they ever rooted in saturated soil. As is true of the closely related C. virginiana, such plants may be disturbance related, coming in where there have been recent clearings, or frequenting fencerows and rights of way at edges of undisturbed woodlands. I have observed weedy growths of these plants in orange groves! They are of course lost in the case of totally destructive logging, clearing for improved pasture, or (and this may be the most destructive influence) herbicide spraying along rows, in groves or fencerows. Quarrying of phosphate rock in the region is also a factor in endangerment.

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SPECIES Clematis catesbyana Pursh (incl. C. micrantha Small)

old man's beard virgin's bower

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X			X	
Damage								
No Lasting Effect								
Beneficial if Done Properly					X	X		

Other Comments: plants are suspected to be dangerous to livestock!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Clematis catesbyana Pursh (incl. C. micrantha Small)



245
100
RANUNCULACEAE→ Clematis socialis Kral [1-3]

Technical Description

Perennial herb similar to C. crispa but forming dense clones by slender, horizontally spreading and branching rhizomes 2-3 mm thick.

Stems.--Erect or ascending from narrow erect caudices, solitary or in small clusters, simple or sparingly branched from next to uppermost nodes, mostly 2-3 (-5) dm high, the internodes several, the lowest shortest, 2-3 mm thick, the leafy ones longest, mostly 3-7, 1.5-2.0 mm thick, bright green or with purple tints, glabrescent or with some persistent pale villosity at and around nodes.

Leaves.--Lowermost leaf pairs scale-like, oblong or triangular, mostly under 1 cm long, smooth; lower foliage leaves simple, sessile or short-petiolate, with blades mostly elliptic-linear, rarely spatulate, linear-lanceolate, or linear-oblongate (3-) 4-12 (-15) cm long, (0.3-) 0.5-1.0 (-1.5) cm wide, ascending or erect, with longer petioles at upper nodes, there becoming pedately trilobate with segments narrow as in simple blades or pinnately compound, with petioles shorter than leaflets, arching-spreading or arching-ascending, the leaflets mostly 3-5, terminal longest, all shaped as in simple leaves, erect, somewhat secund, acute, mucronate, the mucro purplish, glandular, the margin entire, slightly revolute, the base narrowly acute or cuneate, both surfaces pale bright green, glabrescent or with sparse villosity along main veins beneath and on petiole and rachis, the main veins mostly 3 (to 7 in larger leaves or leaflets), strongly raised beneath, the pattern brochiodromous.

Flowers.--Urn-shaped to campanulate, spreading or nodding, solitary at tips of erect, slender, teretish, low-ribbed, variably elongated purplish-tipped, smooth to apically villosulous peduncles. Sepals 4, at anthesis lance-oblong or slightly panduriform 2.0-2.5 (-3.0) cm long, apically spreading or recurved, acute to acuminate, thickest at the cupped base, the margin toward apex thin, dilated-crispate, medially and proximally entire, the convex backs pale but bright blue-violet, sparingly puberulent and strigillose, particularly on the 3-5 raised nerves, more densely so apically, white-villous-tomentulose marginally and on the apical petaloid dilation, the inner surface smooth save at margin, proximally yellowish, faintly impressed-venose, distally blue-violet. Stamens numerous, yellow, the outer ones slightly larger, all linear, 1.8-2.0 cm long, filaments 1.0-1.5 cm long, to 1 mm broad, pilose; other connectives pilose dorsally, apically apiculate. Carpels 1.2-1.5 cm long, the bodies lanceolate, tapering gradually into the elongate styles, the stigmas lineal, 4-5 mm long, smooth save for the bevelled, hairy ventral surface and stigma line, the surface otherwise concealed by a dense, silvery subappressed tomentum. Akene including style 2.5-3.0 cm long, the ovate body ca. 1 cm long, flattened over the seed, marginally spongy-thickened, wire-like, the apex acute, the surfaces appressed-strigillose-puberulous.

Distribution and Flowering Season

Alluvial grass-sedge meadow and contiguous hardwood bottoms,

St. Clair County, Alabama; flowering in April and May.

Special Identifying Features

In regard to leaf character and flower C. socialis is similar to C. crispa L. a common southeastern leather flower which also has bractless peduncles. But C. crispa is a vine, has larger flowers which, while of a similar color, have sepals with broader crispate edges. The most distinctive feature of C. socialis is the combination of rhizomatous habit (no other southeastern clematis has this!) and the formation of dense clones of erect, low, 1-few-flowered shoots. This is a plant of high horticultural potential.

Habitat and Management Implications

C. socialis is as yet known from but a single place. In fact only six clones have thus far been located. The habitat is alluvial. Most of the plants are in full sun, rooted in sticky silty clay, in a grass-sedge-rush community with many carices, Scirpus lineatus, S. atrovirens, Fimbristylis puberula, Rhynchospora caduca, R. corniculata, Eleocharis compressa (an indicator of low sweet soils this area), Juncus effusus, J. coriaceous, J. marginatus, J. filipendulus (almost always found with the Eleocharis), Panicum agrostoides, P. virgatum, Glyceria striata, Leersia, several andropogons, particularly A. gerardi, A. scoparius, A. virginicus, Tripsacum, etc. Patches of Allium, Sisyrinchium are frequent. Dicots typical of low prairie are abundant, particularly Ranunculus fascicularis, R. pusillus, Thalictrum, Cardamine bulbosa, Ptilimnium, Cicuta, Zizia, Phlox glaberrima, many violets, Penstemon laevigatus, Gratiola (particularly G. floridana), many composites including Silphium terebinthinaceum, Liatris spicata, Helianthus angustifolius, aster, goldenrods and various eupatoriums, ragworts, fleabanes.

Adjacent low woodland is made up in the overstory of lowland oaks and hickories, white and green ash, sweet gum, black gum, persimmon, red maple, with an understory of flowering dogwood, swamp cornel, sassafras, buckthorn, elderberry, viburnums. Loblolly pine is frequent to abundant. The site is excellent for lowland hardwood and yellow pine. Careful selective logging of the hardwoods and pine would probably be advantageous to the clematis were there a minimum of mechanical disturbance and no drainage. The immediate hazard to the few known clones of clematis would be the likelihood of subdivision of this creek bottom for residential purposes, together with highway right of way maintenance that would include excessive mowing, scraping or herbicides.

Reference

Kral, R. 1982. A new Clematis from northeastern Alabama. Rhodora 84 (838): 285-291.

SPECIES Clematis socialis Kral

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		x	x	x			x	
Damage	x							
No Lasting Effect								
Beneficial if Done Properly					x	x		

Other Comments: This is a wetlands species, thus anything done to drain the site would have a negative effect

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Clematis socialis Kral



245
RANUNCULACEAE

Clematis viticaulis Steele, grape leather-flower

Technical Description

Perennial herb from an erect or ascending, subligneous rhizome.

Stems.-- Erect, mostly 3-5 dm tall, terete or very slightly angled, brownish, the surface proximally brown, retrorsely strigose, upwardly crisped-pale-puberulent (sometimes ageing smooth) and reddish-brown, branching oppositely or in whorls from all or most nodes.

Leaves.-- Opposite (rarely whorled), all simple, the lowermost scale-like, usually gone by flowering time the largest at about mid-stem, ovate or lance-ovate, mostly 5-8 cm long, acute, usually mucronulate, the margin entire, or rarely with a pair (-3 prs.) of low teeth, the base rounded or broadly cuneate, nearly sessile on short (2-5 mm) crisped-puberulent petioles, leathery, the upper surface yellow-green, smooth, somewhat reticulate, the lower surface paler, arcuately and pinnately veined, strongly reticulate, aging smooth save for puberulent vein bases and axils.

Flowers.-- Regular, bisexual, 1.5-2.0 cm long, erect on erect or upwardly curved, pale-puberulent peduncles 4-6 cm long (these much elongating in fruit); calyx campanulate, the 4 sepals valvate in bud, on expansion lanceolate or oblong-lanceolate, thickish, the acute tips slightly recurved, externally greenish with tints of blue and maroon, strongly parallel-nerved, pale-pilosulous, the thick edges pale-tomentulose; petals absent; stamens numerous, 1.3-1.5 cm long, the flattish filaments distinct, erect, linear, 7-8 mm long, distally pilose, the anthers scarcely broader, the broad connectives appressed-pilose with pale hairs, particularly toward the tip; carpels numerous, distinct, about the length of the sepals at anthesis, erect, the lance-linear, pale-tomentose ovary tapering into slender, appressed pilose style, this with a linear-recurved stigma tip.

Fruit.-- Akenes at maturity aggregated into a loose head at summit of fruiting stalks to 5 cm long; akene body broadly ovate, flattened, ca. 5 mm long, silky with appressed whitish hairs, the persistent slender styles 2-3 cm long densely plumose-hairy from base to stigma base, the hairs reddish-brown.

Distribution and Flowering Time

Shale barrens, Bath and Rockbridge Counties, western Virginia; flowering in June.

Special Identifying Features

C. viticaulis is in the complex of Clematis consisting of erect plants which are non-viney and whose leaves are always simple, usually sessile or short-petiolate. It is nearest C. albicoma Wherry, another shale barren plant, but differs in its puberulent (rather than villose) sepal backs and its reddish-brown plumose styles (rather than whitish-pubescent).

Habitat and Management Implications

Keener (1971), recent monographer of this complex of Clematis, has stated that C. viticaulis is a strict shale barren endemic and is confined to shales of Upper Devonian age. It is usually on a southern exposure, on steep slopes, particularly toward slope bases, usually where these are undercut by stream action. The vegetation is sparse, much of it on weathered rock flakes in a matrix of thin, yellow-brown soil which has an acid reaction. Such genera as Sedum, Hedyotis, Viola, Senecio, Phlox, Eriogonum, Allium, Trifolium, Paronychia, Oenothera, Scutellaria, Melica, Aster, Antennaria, etc., these often also endemic representatives, are associated. The overstory is either absent or rather thin, comprised of low grade specimens of Pinus virginiana, P. rigida, P. pungens, Juniperus virginiana, various dry site Quercus such as Q. ilicifolia, Q. velutina, Q. coccinea, Q. stellata, Q. alba, etc., Nyssa sylvatica, several Carya species and such shrubs as Vaccinium, Ilex, Kalmia, Rhododendron, Oxydendrum, etc. Fire and mechanical erosion (slippage of the fracturing, thin-bedded shales) have doubtless been the historical factors providing open space for the Clematis. Conventional methods of mechanical site preparation are not applicable on this sort of topography. Increase of forest, particularly pine, on such sites would, through shading, eliminate this species.

References

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SPECIES Clematis viticaulis Steele. Grape leather-flower

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA			NA	
Damage								X
No Lasting Effect								
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Clematis viticaulis Steele



245 RANUNCULACEAE

Delphinium alabamicum Kral Alabama larkspur

Technical Description

Perennial herb, the short caudex arising from a cluster of spindle-shaped roots.

Stems.--Usually solitary, erect, 5-10 (-15) dm long, by flowering time with basal nodes and internodes brownish, close-set, often leafless, above with internodes rather abruptly elongating, surfaces proximally often reddish-tinted, glabrous or pilosulous with hairs downcurved, upward on stem becoming pale yellow-green, sparsely to copiously recurved-puberulent or pilose, with an admixture of longer-spreading trichomes, in the inflorescence mostly densely recurved-puberulent and spreading-pilose, the plants unbranched or few-branched from the middle or upper nodes, or in the inflorescence, the branches ascending.

Leaves.--Rosette and lower stem leaves palmately deeply dissected, the segments spreading fanlike into a semicircular or orbicular outline on slender, pilose to nearly smooth petioles much longer than the blades; primary blade segments 3-5, mostly 3-6 cm long, joined only at very base, linear or oblong-linear, cuneate-based, bi-or-tri-branching into short to elongate-linear, spreading-ascending ultimate segments, these mostly acute, nipple-mucronate, the nipple whitish, apically depressed; blade surfaces yellowish-green, the upper smoothish, the lower with scattered pilosity and puberulence, this also along the margins. Leaves above mid-stem increasingly reduced, much shorter than internodes, becoming sessile, mostly 3-lobed, the uppermost linear.

Inflorescence.--Flowers either in a single terminal indeterminate raceme or a compound of a few, ascending racemes, the total inflorescence often fully 1/2 the total plant length and of 15 or more flowers.

Flowers.--Perfect, irregular, showy, the pedicels spreading, arcuately ascending, slender, the lowest longest, often several cm long, all by anthesis longer than the flowers, most subtended by a single, linear, acute, villosulous and hirsute bract and each with 2-3 short-linear, similarly hairy bracteoles distally, the pedicel surfaces with hairs both incurved-tomentulose and spreading-hirsute; sepals 5, an intense, deep, blue-violet, 2.5-3.0 cm broad and from tip of longest segment to tip of spur fully 3.0 cm long, the spur sepal (uppermost and longest) 3 cm long, the spur 1 cm long, the blade broadly oblong, apically acute or short-acuminate, spreading ciliolate, the inner surface smoothish, the outer surface spreading-pilose, the lateral sepals subequal, mostly oblong or obovate, ca. 1.5-1.7 cm long, acute to obtuse, broadly cuneate-based, the outer surfaces (backs) strongly strigose or hirtellous, particularly in the mid-zone; petals in 2 sets of 2, the upper pair connivent to produce a spur, this enclosed by the sepal spur, apically with

short, shallowly notched blades, the lower pair clawed, about as long as the lateral sepals, the blades of a similar color and deeply notched, the spur petals ca. 3 cm long, the spur 1 cm long, blade pale blue to near white, ovate, marginally ciliate, backs pilosulous or pilose, the claw petals bluish, ca. 1.5 cm long, the claw ca. 0.5 cm, bearing at its upper margin basally a spreading, short-oblong, erect auricle, the blade elliptical or ovate, ciliate-erose, narrowly and deeply cleft, the backs villous, the inner surfaces pilosulous; stamens numerous, ca. 1 cm long, the filaments flattened proximally, gradually narrowing and thickening toward the connective, smooth or sparsely hirsute, the anthers ellipsoidal, usually smooth; carpels narrowly lance-ovoid, ca. 0.5 cm long, the ovary sericeous.

Fruit.--Follicles 5, the bodies oblong, ca. 1.5 cm long, slightly spreading apically, pilose, the persistent styles ca. 0.5 cm long, arching outward; seeds somewhat asymmetrically obconic, obtuse-angled, truncate apically, 2 mm long, minutely soft-spreading-hairy, nearly black, the faces with irregular, shallow concavities.

Distribution and Flowering Season

Calcareous clearings or open woodlands or prairies, Black Belt of middle Alabama and in the Highland Rim of northwestern Alabama; flowering from May to mid-June.

Special Identifying Features

Delphinium alabamicum is in the range of two other species that somewhat resemble it, namely D. tricornes Michx., and D. carolinianum Walt. It differs from the former in being a taller plant, has narrower leaf segments, more erect follicles, and slightly longer, darker seeds. It differs from the latter in being a stouter plant, the flowers much larger and deeper in color, the follicles not as erect, the larger, darker seed not scaly.

Habitat and Management Implications

D. alabamicum thrives on basic soils derived from limestones, dolomites, chalks or marls. It is best developed on thin to deep, heavy clay soils, either in the full sun of prairies and glades or in open upland woods bordering such. If part of a prairie assemblage, this species is in association with such grasses as Sporobolus, Panicum, Andropogon, Melica, caricoid sedges, particularly Carex granularis, C. blanda, C. leavenworthii, C. festucacea, C. albolutescens, Scirpus lineatus, rushes such as Juncus interior, J. filipendulus, and a wide variety of prairie forbs in genera such as Silphium, Ratibida, Rudbeckia, Senecio,

Aster, Solidago, Ranunculus (particularly R. fascicularis), Polygaenia, Verbena, Allium, Sisyrinchium, etc. This is the black belt prairie type in which D. alabamicum was once known to occur, but which appears to have disappeared since. The largest extant populations are in northwestern Alabama in open and closing limestone glades, often in association with glade endemics such as Petalostemon gattingeri, Psoralea subacaulis, Leavenworthia, Lesquerella, on shallow soils that in a growing season range from wet enough to support Isoetes, Juncus, Callitriche at certain times of year, dry enough during summer to support Opuntia compressa, Agave virginica. Contiguous open woodlands, these often very limerocky, have this Delphinium. These woodlands are sometimes mostly Juniper, or have an admixture of upland hardwoods, particularly Quercus muhlenbergii, Q. shumardii, Q. alba, Q. stellata, Carya caroliniae-septentrionalis, C. ovata, C. ovalis, Ulmus americana, U. rubra, Celtis, Fraxinus americana, Acer saccharum, etc. with an understory of Rhus, Cornus, Cercis, Bumelia, Diospyros. In that the best specimens of D. alabamicum are definitely either in open areas or at edges of woodlands and are not present in dense, closed stands of juniper-hardwood, it has to be assumed that the Delphinium is seral to juniper-hardwood. Logging will create area for it, has done so locally. The main threat to it at present comes from urban, residential, and industrial expansion. The type locality is now a trailer factory. Conversion of glades to improved pasture admits introduced grasses such as fescue, orchard grass, bermuda grass, which crowd out the larkspur. Conversion of the deeper soils to row crops has also taken place. Therefore it is not logging, but people and crop-oriented activity that makes D. alabamicum truly endangered.

References

- Kral, R. 1976. A treatment of Delphinium for Alabama and Tennessee. Sida 6 (4): 243-265.

SPECIES Delphinium alabamicum Kral. Alabama larkspur

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			X	
Damage								X*
No Lasting Effect	X							
Beneficial if Done Properly					X	X		

Other Comments: *while plants are toxic to stock, they are rarely eaten; however, stock may trample them.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Delphinium alabamicum Kral



245
RANUNCULACEAE

↘ Delphinium newtonianum D. M. Moore, [1-] Newton larkspur

Technical Description

Slender perennial larkspur, the stems arising from a fascicle of fusiform-tuberous roots 2-5 cm long.

Stems.--Erect, branching only in the inflorescence, usually arising singly from the rootstock, stiff but slender and fistulose, proximally usually purple-tinted, retrorsely and sparingly strigillose, increasingly short-recurved-pubescent upward into the inflorescence.

Leaves.--Alternate, both basal and cauline, the basal and lower cauline leaves long-petiolate, absent by flowering time, the persistent cauline ones largest toward or below mid-stem, on slender ascending, ribbed, sparsely villous or glabrous, green petioles to 10 cm long (usually shorter, particularly the upper ones), the blades in outline semicircular or reniform, mostly 8-15 cm wide, 4-7 cm long, deeply cleft-and-parted, the principal segments 3-7, spreading fanlike, mostly narrowly cuneate or oblanceolate, acute-tipped, upwardly ciliate, entire or themselves apically deeply 2-3-lobed, the blade base usually truncate; leaf surfaces above yellow-green, smooth or sparsely hirsute along the main veins, beneath much paler, hirsute along the main veins.

Inflorescence.--Few-to-many-branched, the branches spreading from the axils of the gradually reduced, simple or fewer-lobed, short-petioled upper stem leaves, recurved-puberulent, terminating in linear-bracteolate, open cymose racemes; pedicels slender, divaricate, mostly 1-3 cm long, bibracteolate, puberulent.

Flowers.--Distinctly zygomorphic, perfect, very showy; sepals 5, distinct, strongly unequal, the uppermost largest, spurred, the spur near white, ca. 2 cm long, projecting back, the blade spreading upward, ovate, similar to the pair of laterals and lower ones, all blades a very pale but bright blue, the margins ciliate, the surfaces nearly smooth save for a villosulous, yellowish-green sub-apical-distal thickened area (nectary?); petals 4, unequal, the blades projecting forward but shorter than the sepals, the upper pair with spurs projecting backward into the sepal spur, apically short-ovate-bladed, the blade bifid, hispid-hirsute, pale blue or near white, the lower pair with reduced spurs, strongly clawed, the broader, larger, pale blue blades deeply cut, hispid-hirsute; stamens numerous, distinct, projecting forward, the long filaments blue, somewhat flattened, apically slender, terminating in deep brownish, ellipsoidal, basifixed anthers; carpels 3, lance-ovoid, distinct, smooth, each tapering apically into purplish blue, slender styles shorter than the stamens and each terminating in a truncate-papillose stigma.

Fruit.--Follicles usually 3, smooth, pale green, cylindrical-falciform, without the persistent style ca. 1.0-1.3 cm long, somewhat arching outward apically at maturity; seeds broadly ellipsoidal, pale brown, ca. 2 mm long, minutely and uniformly puberulent.

Distribution and Flowering Season

Dense to open upland woods over limestones; north-central and northwestern Arkansas; flowering from late May nearly through July.

Special Identifying Features

Its inflorescence is basically cymose, thus is determinate. That of the others (D. virescens, D. treleasii, D. carolinianum, D. tricornis) is an indeterminate raceme. D. virescens, D. treleasii and D. carolinianum all have narrower, longer inflorescences and all are plants of full sun or at most light shade, all have smaller flowers. The only other woodland larkspur in Arkansas is D. tricornis, which has a similar rootstock but which is a much lower, stouter-stemmed plant having (usually) a deeper violet-blue color of flowers, which are produced much earlier in the season.

Habitat and Management Implications

D. newtonianum prefers light to heavy shade of hardwoods, a moist loamy clay or sandy clay loam. It may be seen on the edge of such woodlands (as Dr. Moore himself first saw it!) but the large healthy stands are always in shade, and rooted in moist soils. Usually the site is sloping, sometimes steeply so, and it is often over calcareous rock or dotted with boulders of calcareous rock or sandier rock dislodged from above. In the overstory are such hardwoods as red oak, shumard oak, white oak, black oak, etc., red hickory, mockernut, pignut, hard maple, white ash, various elms, hackberry, etc., in short a facies of mixed mesophytic forest. The herbaceous cover is largely that of rich deciduous forest, namely Ranunculus, Hepatica, Anemone, Phlox divaricata, Arisaema, Sanguinaria, Actaea, etc., mostly long past flowering. Cimicifuga racemosa, Campanula americana, Galium arkansanum are usually present and overlapping in flower and several woodland grasses in genera Bromus, Elymus, Festuca, Panicum, Chasmanthium may be abundant.

The habitat is sensitive, easily erodible, and this is the problem. If the valuable species of hardwoods that make up the overstory are heavily logged, the slopes erode, the soils dry out, and several noxious species of weedy shrubs and vines move in, crowding out whatever Delphinium might survive the shock of the logging operation. The Delphinium is a definite sciophyte favoring moist, rich substrates, and thus would stand little chance of survival. Since a good part of the known area for this rare plant is still in private ownership, it is hoped that these owners are influenced to practise selective logging of their timber tracts.

References

- Moore, D. M. 1939. Delphinium newtonianum, a new species from the Arkansas ozarks. *Rhodora* 41: 193-197.
- Keener, C. S. 1976. Studies in Ranunculaceae of southeastern U.S. IV. Genera with zygomorphic flowers. *Castanea* 41: 12-20.

SPECIES Delphinium newtonianum D.M. Moore. Newton County larkspur

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X		X	NA	
Damage	X							X*
No Lasting Effect					X			
Beneficial if Done Properly								

Other Comments: *plants are toxic to livestock and often are untouched by them, but may be damaged by trampling.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Delphinium newtonianum D. M. Moore



245
RANUNCULACEAE

100
→ Thalictrum cooleyi Ahles, Cooley's meadow-rue

Technical Description

Perennial, smooth herb from a slender, erect caudex.

Stems.-- Erect or leaning on other plants, slender, greenish, to 1 meter tall or slightly more, teretish but with a few low, minutely scabrid ridges.

Leaves.-- Both basal and cauline, the lowermost cauline leaves and basal leaves petiolate, ternately compound, the ultimate leaflets lanceolate to lance-linear or ovate (highly variable in shape and length), mostly 1-2(-5) cm long, 0.3-1.0 cm broad, the laterals nearly sessile or on slender petiolules to 5 mm long, the terminal one often longer-stalked, leaflet apices rounded to acute, the margins entire or (in larger leaflets) often 1-3 lobed or with a strong pair of lateral teeth, the venation of larger leaflets ternate or subpalmate, the bases rounded or acute; larger petioles 0.4-1.0 dm long, ascending, slender but with broadly scarious-auriculate clasping bases; stem leaves progressively smaller, shorter-petioled, more distant upward on stems, in the inflorescence sessile or nearly so.

Inflorescence.-- Flowers few, in an open panicle on slender pedicels to 2 cm long.

Flowers.-- Regular, unisexual (the species is dioecious); sepals mostly obovate, 4-5, distinct, early deciduous, the staminate ones yellowish to white, ca. 2 mm long, broadly rounded or bluntly acute, apiculate, slightly longer than the greenish pistillate ones; petals absent; stamens with slightly clavate, lavender filaments ca. 5-7 mm long, the yellowish anthers ca. 2 mm long, apiculate; carpels several, fusiform, distinct, short-stipitate, many-ribbed, smooth save for the minutely hairy, linear stigmas.

Fruit.-- Akenes narrowly ellipsoidal, ca. 5-6 mm long, 1.5-2.5 mm wide, many-ribbed, the stigmas persisting, straight but bent somewhat inward at base.

Distribution and Flowering Season

Moist to wet savanna-bogs, Coastal Plain, eastern North Carolina; (North-west Florida; Georgia (a possible hybrid according to Dr. Rayner!))

Special Identifying Features

According to Ahles (1939), describer of the species, T. cooleyi differs from all others of its section (Leucocoma) in its lavender (instead of white) filaments, its much narrower leaflets (narrowly lanceolate instead of oblong to ovate) and its fewer leaf divisions.

Habitat and Management Implications

T. cooleyi is in high hydroperiod soils of pineland savanna or pocosin clearings where it is scattered in grass-sedge, where associated with such

genera as Dichromena, Zigadenus, Calopogon, Dionea, Habenaria, Sarracenia, Parnassia, Eryngium, Oxypolis, Rhexia, Asclepias (lanceolata, rubra) Cacalia, Eriocaulon, etc. The clearings are in a shrub type made up of Myrica, Ilex (glabra, coriacea), Vaccinium, Lyonia, Andromeda, Zenobia, Rhododendron, etc. and usually the scattered overstory is comprised of P. palustris, P. taeda, Taxodium ascendens, Liriodendron, Acer rubrum, Nyssa biflora, etc. Visits to previously known localities in 1976 and again in 1977 revealed no plants, but Stephen Leonard and Douglas Rayner have since (1980) relocated populations. All these areas were either in plantation pine (Slash) or in various states of site preparation involving drainage, plowing, discing or bulldozing plus raking. The ecological history of this species is probably similar to that of other wet savanna species, clearings being largely maintained through removal of competing woody vegetation by fire. It is obvious that this very rare plant has become even more rare through the extensive drainage, site preparation and planting to pine done within its small known range.

References

- Ahles, H.E. 1959. Thalictrum cooleyi, sp. nov. Brittonia 11: 68-70.
- Radford, A.E., H.E. Ahles and C.R. Bell. 1968. Manual of the vascular flora of the Carolinas. Chapel Hill, N.C.

SPECIES Thalictrum cooleyi Ahles. Cooley's meadow-rue

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Thalictrum cooleyi H. Ahles



245
RANUNCULACEAE;Thalictrum debile Buckley [L-8].T. arkansanum Boivin

Technical Description

Delicate, smooth, dioecious, perennial from a shallow-set cluster of brown, fusiform or carrot-shaped tubers, the aerial parts dying back quickly in late spring after fruit is ripe.

Stems.--Slender (at most to 2 mm thick), lax, prostrate, decumbent-based, erect to leaning or prostrate, 1-several per tuber cluster, mostly 3-4 dm long, the base pale, of ten producing only leaves, mainly terete but prominently few-ribbed, proximally stramineous, distally green or purple, usually with several ascending branches.

Leaves.--Alternate, the lowermost close-set, of scarious scales mostly under 1 cm long, these larger and more distant upward on stem grading in the lower 1/3 of the stem to 2-3-ternately decompose foliage leaves, these with long, slender, ribbed, ascending petioles which at base abruptly flare into clasping broad ovate scarious stipules 5-10 mm long. Leaflets numerous, thin, yellow-green, usually in 3's on ultimate branches on petiolules 3-20 mm long, in outline mostly obovate, suborbicular or reniform, mostly 0.5-1.5 cm long or wide, 3-5-lobed, the lobes oblong or nearly round, the main veins palmate, the secondary venation delicately reticulate. Stem leaves from midway up stem becoming progressively smaller, more distant and with fewer divisions and leaflets, grading into the inflorescence, the uppermost becoming simple green blades or modified to small, clasping scarious ovate scales.

Inflorescence.--Paniculate, indeterminate, often fully 1/2 the plant in length, branched toward the base, in flower narrow with all primary branches bearing one-to-several capillary pedicels/node, the lower pedicels longest, to fully 3 cm, progressively shorter upward on the axis.

Flowers.--Regular, unisexual, the sepals 4, distinct, spreading-ascending, oblong or narrowly ovate, 2-3 mm long, acute, rounded or cuspidate, entire to erose, parallel ribbed, the backs purplish or pale green with broad scarious borders; male florets with 12-15 (-18) stamens, the filaments filiform, yellowish or reddish, ca. 2 mm long, the anthers yellow, oblong-lineal, apiculate, 1.5-2.0 mm long; female florets with (1-) 3-5 spreading carpels, the styles at anthesis upcurved, tapering-lineal, ca. 1.5-2.0 mm long, largely stigmatose.

Fruit.--Body of akene oblong-ellipsoidal to compressed-cylindric, often slightly falciform, not stalked, 3-4 mm long, the style and stigma persistent as a lineal beak, the surface green, longitudinally with 10-12 strong purple-brown ribs.

Distribution and Flowering Season

Alluvial woodlands, various provinces, northwestern Georgia, Alabama, Mississippi, Arkansas, Oklahoma and northeastern Texas. Flowering from early March to late April, fruiting from late March into May and dying back soon thereafter.

Special Identifying Features

According to Boivin (1944, pp. 432-433) *T. debile* belongs to Sectio Heterogamia, Subsectio Debilis with the latter having but three species namely *T. texanum* (Gray) Small, *T. debile* Buckley and *T. arkansanum* Boivin. The first, *T. texanum*, is endemic to southeastern Texas, has ovoid fruit, much shorter stigmas, blackish tubers. However, examination of a series of plants called either *T. debile* or *T. arkansanum* will show so much overlap in critical characters of leaf, flower, fruit and rootstock that it becomes impossible to distinguish the species if one does not know where the specimen was collected. The only other non-stipitate-fruited dioecious species of Thalictrum that could share range with *T. debile* is the more robust *T. dioicum* L. which has a more erect habit, less tuberous roots, and more stamens/flower.

Habitat and Management Implications

My remarks are confined to the personal experience with the plants in Georgia, Alabama and northeastern Texas. The habitat appears to be fairly uniform, being low alluvial woodlands. The overstory is primarily hardwoods, though some loblolly pine may occur locally. Common species are river birch, willow oak, water oak, laurel oak, cherrybark oak, bur oak, white oak, swamp post oak, durand oak, shumard oak, nuttall oak, water hickory, shagbark hickory, pignut hickory (vars leiodermis, megacarpa), cottonwood, red mulberry, american elm, slippery elm, winged elm (wingless in the lowlands), sycamore, sweet gum, honey locust, American basswood, possumhaw, various cornel, both white and green ash, swamp red maple, persimmon. The thalictrum is usually on low rises in the bottoms, such as might be created by natural levees or cut off from old meanders. Sometimes the plants are thick around the broad bases of old trees. In any event they are frequently flooded in high water stages of the streams. Associated herbs may include Polygonum (particularly P. virginianum), Urtica, Laportea, Stellaria, Ranunculus (particularly R. fascicularis) other Thalictra, Podophyllum (it is best to look for mayapple clones when searching for sites in the bottoms!), Cardamine, Dentaria, numerous violets, Claytonia virginica, several lowland composite in Senecio, Erigeron, etc. Combinations of these vary within the range of the species as do combinations of monocot associates, but usually there are Trillium, Allium, Uvularia, Polygonatum, many grasses in genera Panicum, Glyceria, Poa, Agrostis, Chasmanthium and sedges in genera Carex (particularly C. cherokeensis, C. debilis, C. intumescens, C. flaccospemma, C. amphibola), Scirpus.

The hardwood forest often contains valuable species. Clearcutting of these forests poses a major threat in that flooding becomes more common, too much light is admitted, and woody and herbaceous weeds invade. As is true for many spring woodland herbs, *T. debile* vanishes from grazed woodlands.

References

- Boivin, B. 1944. American Thalictra and their allies. Contribs. Gray Herbarium CLII: 338-491.

SPECIES Thalictrum debile Buckley

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	x	x	x	x		x	x	x
Damage					x			
No Lasting Effect								
Beneficial if Done Properly								

Drainage of the site would destroy this species
Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Estimated range of Thalictrum debile Buckley



245
MAGNOLIACEAE:

Magnolia ashei Weatherby, ^ Ashe magnolia
L.H.

Technical Description

A small tree or large shrub, and rarely to 30 ft. tall, the trunk single, ascending, rarely straight, or trunks several and spreading-ascending from a common root.

Bark.--Beechlike, from a short distance appearing smooth, grayish or pale gray-brown, close up minutely warty-roughened, thin, on oldest specimens sometimes checking.

Twigs.--Stoutish, the new shoots frequently to 1 cm thick, terete, gray-green, sericeous with short, appressed, silvery hairs, the leaf scars nearly round, bundle traces numerous, the stipule scars girdling the shoot; terminal bud (usually containing a flower) lance cylindric, conic-tipped, fully 4-6 cm long, densely appressed-silvery-tomentose.

Leaves.--Conspicuously large, frequently 6-7 dm long, those of a season frequently rather crowded in close spirals toward shoot tips, ascending to spreading on stoutish terete, appressed-white-tomentose petioles 5-9 cm long, the blades obovate, the abruptly narrowed tip narrowly rounded or emarginate, the margin entire, crispate-undulate, the base evidently auriculate, the upper leaf surface deep green, at maturity smooth, the lower surface very glaucous, chalk-white with appressed and spreading-villous hairs.

Flowers.--Solitary at tips of expanding shoots, usually approaching anthesis shortly after subtending leaves have begun to harden in late spring, symmetrical, bisexual, the receptacle very elevated, cylindric; perianth segments mostly 6, seemingly in 2 sets, mostly oblong-obovate, rather fleshy, creamy-white with purplish-red blotches toward their bases, at first erect with tips only spreading, forming a fragrant "tulip" fully 1 dm high, later spreading into a flower fully between 2 and 3 dm broad, soon thereafter abscising; stamens numerous, spirally arranged, the short filaments erect, the connective broad, cream, the yellowish anther sacs linear; carpels numerous, distinct, spirally arranged, whitish-puberulent, the stigmas linear, lateral on the excurved styles.

Fruit.--A conelike, subcylindric aggregate 5-7 cm long, ca. 3-4 cm thick of woody, short-beaked follicles ca. 1.3-2.0 cm long, externally roseate at first maturity, later becoming brownish, splitting along 1 line, revealing bright red, slightly laterally flattened, bean-shaped seed, these dangling out on long funicular strands.

Distribution and Flowering Season

Ravines in hardwood forests or in oak-pine hills, western Florida from Leon to Walton Counties; flowering in April and May.

Special Identifying Features

Magnolia ashei is thought by some to be merely a variant of M. macrophylla, a taller taxon with a much wider range, and which has a rounder, often shorter, definitely broader aggregate of follicles. Dr. R. K. Godfrey, an authority on trees of northern Florida, states (1962) that M. macrophylla does not occur in Florida. If, as is now believed, the early report of M. ashei from eastern Texas is based on M. macrophylla, M. ashei is indeed a geographically distinct entity.

Habitat and Management Implications

M. ashei is rooted in the moist sandy loams of ravine slopes and narrow creek bottoms of western Florida. Associate species are mesophytic and include M. grandiflora, M. virginiana, Persea, Acer barbatum, A. leucoderme, Illicium floridanum, Fagus, various willow oaks, Asimina parviflora, Ilex, Halesia, etc. Pines such as P. taeda, P. glabra may be frequent in the overstory.

Such ravines often have trees of high value and many within the narrow range of M. ashei have been logged heavily, usually clearcut. These kinds of operations, usually involving tractors and other heavy equipment, if they do not kill the scattered magnolias outright by breaking or otherwise damaging crowns and roots, create openings, increase soil erosion, and in general reduce the quality of the site for M. ashei, which seems to be an obligate understory species. Therefore it generally gives way to weedier species over time. In short, this species (or variety?) is in considerable danger.

References

- Kurz, H. & R. K. Godfrey. 1962. Trees of northern Florida. Univ. of Florida Press, Gainesville.
- Miller, R. F. 1975. The deciduous magnolias of west Florida. *Rhodora* 77: 64-75.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 535-536. Chapel Hill, N. C.
- Weatherby, C. A. 1926. A new magnolia from west Florida. *Rhodora* 28: 35-36.

SPECIES Magnolia ashei Weatherby. Ashe magnolia

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X	X	
Damage					X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Magnolia ashei Weatherby



245 MAGNOLIACEAE; [5-11]

→ Schizandra glabra (Brickell) Rehder, Smooth magnolia vine;
bay Star-vine or Wild Sarsaparilla
(S. coccinea Michx.)

Technical Description

A woody vine, both twining and clambering on both understory and overstory shrubs and trees.

Stems.--Bark pale gray-brown, smooth, interrupted by raised, largish, tan, lenticels. Winter buds ca. 4 mm long, ovoid, sharp-tipped, reddish-brown, imbricate-scaled. Leaf scars elevated, round, with 3 bundle traces toward the center; stipular scars lacking.

Leaves.--Produced alternately on shortish, stout knobby spur shoots or on long shoots, are smooth, deciduous, thin, mostly obovate or elliptic, to 10 cm long, acuminate, the edges above the mid-point low-toothed, the bases gradually or abruptly narrowed to slender stalks up to 4 cm long.

Flowers.--The flowers, produced singly from leaf axils, are on spreading-drooping slender stalks up to 5 cm. When fully open they are somewhat flattened as in strawberry bush, in outline round, about 1.5 cm. wide, the sepals mostly short-oblong, round-tipped, yellow-green, the petals broadly elliptical or short-oblong, a maroon color (much like those of Anise-tree). The flowers are unisexual, usually both developing on the same shoot with female usually opening first. The stamens are joined together into a flattened 4-6-notched disc with the anthers borne along the sides of the narrow notches. The ovaries are numerous (as in buttercup, blackberry), small, raised on the receptacle which elongates after fertilization.

Fruit.--The fruit is of berries, borne like narrow bunches of grapes along the fruiting axis. Each berry has two seeds, is roundish, yellow-green when ripe, and ca. 1 cm long. No parts of the plant are edible.

Distribution and Flowering Season

This vine occurs naturally only in the Atlantic and Gulf Coastal plains from North Carolina south to northern Florida, west to Louisiana and up the Mississippi Embayment into western Tennessee and east Arkansas. In Alabama it is found inland to the southern tip of the Appalachians in Bibb County. It blooms from late June to August.

Habitat and Management Implication

S. glabra, or wild sarsaparilla, is always in heavy woods, usually in the understory, usually in bottomlands or in the bluffs along creeks and rivers generally on rich sandy-silt-loams. The forests it frequents are almost always mixed-mesophytic. Selective cutting of such areas should not effect the vines, but clear-cutting would adversely effect this shade tolerant species, in that it

is a plant usually of steepish terrain or in bottoms where heavy logging and subsequent erosion would have a negative effect.

Reference

Small, J. K. 1933. Manual of the Southeastern Flora, P. 534. Chapel Hill, N.C.

SPECIES: #37 Schizandra glabra (Brickell) Rehder, Bay star-vine or Wild sars

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage						X		
No Lasting Effect	NA	→					NA	
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Schizandra glabra (Brickell) Rehder



245
ILICACEAE

Ilicium parviflorum Michx. ex Vent. [1-3] Yellow anise tree,
star-anise

Technical Description

Large shrub or small tree to 7 meters from a shallowly spreading root system.

Stems.--The trunks single or several from the root, erect or leaning outward, the bark grayish-brown, smoothish, the fresh wood, twigs, leaves and flowers smelling of licorice. Branching slender and forking, the newer shoots slender, smooth, greenish-brown or tan, leafy only toward the tips.

Leaves.--Alternate in close spirals, persistent, spreading-ascending on greenish, grooved, slender petioles 2-3 cm long, the blades oblanceolate or elliptic, the largest mostly 10-15 cm. long, leathery, acute but blunt and rounded-tipped, the margins entire, very slightly emarginate, the base narrowly cuneate or attenuate, the upper surface a dark, glossy green, the lower surface paler, finely pale gland-dotted, only the midrib prominently raised.

Inflorescence.--Flowers 1-few, set in the terminal clusters of leaves on slender, pale, greenish spreading or erect stalks to 3 cm long, symmetrical, about 2 cm across.

Flowers.--Sepals 3-6, ovate, greenish, under 1 cm long. Petals numerous, ovate or oblong, about 1 cm long, yellowish, spreading. Stamens numerous, ca. 3 mm long, the filaments broad as the anthers, linear, somewhat flattened, spreading to form a ring; anther sacs 2, short-oblong. Carpels numerous, forming a ring, at first erect, tapering to narrow, outward pointing tips.

Fruit.--Follicles spreading like the rays of a star, the whole cluster about 2 cm broad, splitting along the upper edge each to release a single brown shiny seed.

Distribution and Flowering Season

Low hammocks along streams, northeastern peninsular Florida. Flowering in May, June.

Special Identifying Features

This unique tree is confined to the tributary systems of the lower St. Johns River. It is distinguished from the more widespread I. floridanum by its leaf tips which are blunt rather than sharply acute or acuminate, by its smaller, greenish-yellow flowers, by its somewhat smaller fruit.

Habitats and Management Implication

I. parviflorum is typically a plant of low hammocks on sandy loams or sandy peat mucks, in short on soils that are continuously moist. It is entirely within a karst country, generally along sandy-bottomed clear

streams that arise from limesinks, usually in the shade of larger trees such as Magnolia virginiana, willow oaks, occasionally cypress, gum and associated with waxmyrtle, Lyonia, cabbage and saw palmetto, Ilex cassine, Cyrilla, Persea, Gordonia, etc. and never reaches up into the contiguous stands of upland evergreen scrub oak, scrub pine or longleaf. It is thus an understory small tree, quite shade tolerant, its reproduction scant, succeeding on moist, highly organic, shaded soils, although it may be cultivated in full sun. Drainage or cutting, particularly clear-cutting, would be detrimental. The trees, sometimes sold as I. anisatum, have been commercially exploited and are rare and local enough to comprise a truly endangered species.

References

- Small, J. K. 1933. Manual of the southeastern flora, pp. 533-534. Chapel Hill, N.C.
- Stone, D. E. and Judith L. Freeman. 1968. Cytotaxonomy of Ilicium floridanum and I. parviflorum (Illiciaceae). Journ. Arn. Arb. 49(1): 41-51.

SPECIES: #144 Ilicium parviflorum Michx. ex Vent. Star-anise

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X	X	X		X		
Damage							NA	?
No Lasting Effect	NA				X			
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Ilicium parviflorum Michx. ex Vent.



ANNONACEAE

Asimina tetramera Small ~~Opposum pawpaw~~

Pityothamnus tetramerus Small

Technical Description

A tall pungently scented shrub or even small tree, to 3 meters tall, from a stout, deep taproot.

Stems:--Primary stems 1-several, these erect or arching, smoothish, the bark reddish-brown or grayish with raised small lenticels, that of new shoots sometimes with small reddish hairs.

Leaves:--Alternate, lacking stipules, mostly oblong or oblanceolate, spreading wide and slightly upward on the shoots to form a "V", between 5 and 10 cm long, the tips broadly acute to blunt, the margins slightly rolled-inward to the midrib beneath, the bases usually acute to short stalks. The upper leaf surface deep green, somewhat lustrous; the lower leaf surface paler, raised-veiny.

Inflorescence:--The regular flowers produced singly or in 2's from all upper leaf axils of a fresh shoot on nodding peduncles to 2 cm long; maroon, fetid-smelling, about 3 cm broad.

Flowers:--Sepals 4, rarely 3, triangular, greenish with lines of short, reddish hairs, shorter than the outer petals. Petals 6, in 2 sets of 3 each, with the outer longest, pale maroon, oblong, blunt, slightly spreading, inrolled; the inner 3 petals are ovate, cup-like at the base. Stamens numerous, arranged in a tight greenish ball on the receptacle. Carpels (pistils, ovularies) several, borne at the tip of the receptacle (torus).

Fruit:--The receptacle swells after fertilization to become a largish ball on which 3-5 or more big, greenish-yellow, peanut-hull-shaped berries develop, these up to 9 cm long, and with edible flesh. The seeds are the size and shape of a kidney bean, with the coat a dark, lustrous brown.

Distribution and Flowering Season

This rare shrub is infrequent in sandscrub in southeastern peninsular Florida from Martin Co., south into Palm Beach County. It blooms from May through August or all during the growing season.

Habitats and Management Implication

A. tetramera, which in flower strongly resembles the northern pawpaw, is a shrub of deep, rather fine-textured sands, mostly old dunes inland from the present coast. It is usually in open stands of Sand Pine, scattered amongst understory plants such as Sabal, Serenoa, Ceratiola, Lyonia, scrub Quercus, Carya, and other shrubby Asimina. It responds favorably to fire, rapidly producing numerous new shoots from its thick, long taproot. It responds favorably to cutting back as well, so that burning or mechanical

damage actually promote flowering and fruiting in that flowers do not develop well on old bushes. Discing if not accompanied by wholesale raking and windrowing of all vegetation would probably promote its growth, in that the rootstocks can be cut up and each piece produce new growth. The principal threat faced by this species is the wholesale subdivision and land development for retirement and other housing that is occurring in the area. Clear-cutting and surface removal of understory to reveal the almost pure sandy soils would increase the species, which spreads naturally into such clearings. The seeds are doubtless buried by some mammals or by gopher turtles; exact information about dissemination is not available. The species is intolerant of heavy shade, does best in clearings or open stands. Crown closure of pine overstory would suppress, ultimately eliminate, the species. Another natural competitor are the palmettos which likewise abound in these situations but which are less likely to be shaded out by the pine.

References

- Kral, R. 1960. A revision of Asimina and Deeringothamnus (Annonaceae).
Brittonia 12 (4): 233-278.
- Small, J. K. 1926. A new pawpaw from Florida. Torrey 26: 56.
- _____. 1933. Manual of the southeastern Flora, pp. 530-531.

Revised March 1980

SPECIES: #108 Asimina tetramera Small. Opposum pawpaw

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect		X	NA	X				X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Asimina tetramera Small



245
ANNONACEAE

110
C-21
Deeringothamnus pulchellus Small, ^{slim-petal} pawpaw; N.C.N.
Asimina pulchella (Small) Rehder & Dayton

Technical Description

Similar in root stock, stem, leaf and fruit to Deeringothamnus rugelii, differing only in its narrower petals which are more recurved, and in its white to pale pink flower color. The odor of the flower is faint but very pleasant.

Distribution and Flowering Season

Similarly rare, this shrub is found only toward the coast in southwestern peninsular Florida, mostly in Lee and Charlotte counties. It is probably most abundant on Big Pine Island near Fort Myers.

Habitats and Management Implication

It is always in open stands of slash pine with the woody understory being mostly saw palmetto, together with some Lyonia, Asimina, ground oak, etc. As is the case with D. rugelii this is a plant of high hydroperiod sandy soils and its response to logging and site preparation methods is the same.

References

- Kral, R. 1960. A revision of Asimina and Deeringothamnus (Annonaceae) *Brittonia* 12 (4): 233-278
- Rehder, A. and W. Dayton. 1944. A new combination in Asimina. *Journ. Arn. Arb.* 25: 84.
- Small, J.D. 1924. Plant novelties from Florida. *Bull. Torr. Bot. Club* 51: 390.
- _____. 1926. Deeringothamnus pulchellus. *Addisonia* 11: 33-34, pl. 369.
- _____. 1933. *Manual of the southeastern flora*, pp. 531-432. Chapel Hill.

SPECIES: #109 Deeringothamnus pulchellus Small, N.C.N.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect		X	X	X				
Beneficial if Done Properly	X				X	X		X

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Deeringothamnus pulchellus Small



Paper 110
Text & map by:
Robert Kral

100

245
ANNONACEAE

[1-2]
Deeringothamnus rugelii (Robins.) Small / Rugel's
pawpaw; N.C.N.
Asimina rugelii Robins.

Technical Description

A low, sparingly branched, pungent-smelling shrub, rarely to 0.5 meters tall, from a stout taproot.

Stems.--Shoots slender, pale brown, smoothish, arching or erect, seldom branched.

Leaves.--Alternate, erect, leathery but deciduous, to 7 cm long but mostly around 4 cm, mostly oblong, blunt, entire and slightly inrolled, on very short stalks, smooth, dark green above, paler and raised-net-veined beneath.

Inflorescence.--Flowers solitary in leaf axils, spreading or nodding on slender stalks.

Flowers.--Sepals 3, oblong, about 1/2 cm long, green. Petals 6, nearly equal, narrowly oblong, about 1.5 cm long, canary yellow. Stamens many, in flat-topped cluster shorter than the petals. Carpels spindle-shaped, several, ripening into usually 5, peanut shaped berries.

Fruit.--Berries smooth and yellow-green when ripe and between 3 and 6 cm long. Seeds about the size and shape of brown beans.

Distribution and Flowering Season

This rare shrub occurs naturally only in northeastern peninsular Florida (Volusia, Seminole, Cos.). It blooms erratically from April throughout the growing season.

Habitats and Management Implications

D. rugelii is always found in slash pine-saw palmetto flatwoods on deep, fine-textured, poorly drained sands or sandy peats. Commonly its shrubby associates are Befaria, Lyonia ferruginea, L. lucida, Vaccinium and Ilex of the gallberry group. Wiregrass, Panicgrass, and Andropogon, together with several sedges, Eriocauls and xyrids are common herbaceous associates.

It is mostly found in the semi-shade of slash pine woodlands, frequently in areas where logging of this plant is extensive, and its increase may be favored where natural regeneration is allowed. Clear cutting, if the natural understory is not disturbed, would not effect it. Ground fires tend to increase it, the plants actually losing ground during long periods of no fire and being stimulated to produce vigorous flowering shoots from their large storage roots by fire. Any site preparation method that would involve shearing at the ground level would tend to increase it, having an effect similar to fire in reducing competition. Discing has been demonstrated to increase this sort of species in that new shoots can arise adventitiously from the cut roots, but deep plowing or mounding or the bulldozing of all

vegetation into windrows would eliminate the species. Drainage would ultimately remove it, as it is high hydroperiod dependent. Grazing has little effect, in that cattle find this shrub unpalatable.

In nature this species is fire dependent, thus any sort of management that would exclude fire would at the same time encourage the competitive shrub and herbaceous vegetation to take over.

References

- Gray, A. and S. Watson. 1895 Asimina in Synoptical Flora of North America, Vol. I, Pt. 1, p. 64.
- Kral, R. 1960 A revision of Asimina and Deeringothamnus (Annonaceae). Brittonia 12 (4) 233-278
- Robinson, B.L. 1897. Suppl. Syn. Flora of North America, Vol. I, Pt. 1, p. 465
- Small, J.K. 1930. Deeringothamnus rugelii. Addisonia 15: 17-18; pl.

SPECIES: #110 Deeringotharmus rugelii (Robins.) Small. N.C.N.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect		X	X	X				X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Deeringothamnus rugelii (Robins.) Small



245
LAURACEAE:

→ Lindera melissaefolium (Walt.) Blume, [1-2] Swamp spice bush;
 Jove's-fruit
Benzoin melissaefolium (Walt.) Nees

Technical Description

Low, aromatic, deciduous, thicket-forming shrub, rarely to 1 meter tall.

Stems.--Numerous; shoots erect or ascending, the young twigs hairy, the buds densely hairy.

Leaves.--Alternate, drooping on short, slender, hairy petioles, the blades oblong, elliptic or narrowly ovate, thinnish, 5-16 cm long, 2-6 cm wide, acuminate, entire, the bases rounded, dark green above, paler and pubescent beneath.

Inflorescence: Plants unisexual. Flowers in short stalked umbels in the axils of the leaf scars, opening before the leaves, usually few to cluster on pedicels 9-12 mm long.

Flowers.--Sepals 6, oblong, about 2 mm long, bright yellow. Staminate flowers with 9 fertile erect or ascending stamens, the anthers opening by valves (flaps). Female flowers with numerous orange-yellow fleshy staminodes, the ovary superior, ovoid, with an elongate style.

Fruit.--Fruiting pedicels stoutish, definitely thickened apically. Drupes ellipsoidal or obovoid, 10-12 cm long, bright red when ripe.

Distribution and Flowering Season

Sandy sitty sink hole depressions and swamps, in the Coastal Plain from North Carolina south to northern Florida, thence west to Louisiana and north in the Mississippi Embayment to southeastern Missouri. One of our rarest shrubs.

Special Identifying Features

The observations of Dr. Julian Steyermark (1949) are the best. He noted the following differences with the quite common Spicebush, L. benzoin (L.) Blume.

1. It is a shorter shrub. L. benzoin grows to mostly 1.6-4.5 meters.
2. Crushed twigs and leaves have a sassafras odor in contrast to the strong benzine odor of L. benzoin.
3. The leaves of L. melissaefolium droop; those of L. benzoin are spreading or ascending. Those of the former are densely hairy beneath; most L. benzoin (save for L. benzoin var. pubescens) tend to be smooth or smoothish. Bases of leaves of L. melissaefolium tend to be rounded; those of L. benzoin taper.
4. Fruiting pedicels are stouter, longer, more enlarged toward the tip: also they tend to persist on the shrubs until flowering time, while in L. benzoin taper.

Habitats and Management Implication

Both species frequent soils that never dry out, but L. melissaefolium is strictly confined to swamp hardwood sites while L. benzoin is very often under-story to mixed-mesophytic forest.

The common species of overstory for L. melissaefolia are various swamp oaks (Q. palustris, Q. phellos, Q. laurifolia, etc.) hickories, ash, Acer saccharinum, Arubrum. Steyermark (l.c.) found the shrubs in sandy potholes dominated by an overstory of Pin Oak and Pumpkin Ash, with what remained of the surrounding higher forest being made up of Sugar Maple, Flowering Dogwood, Aralia, Asimina.

It is obvious that this shrub is a plant of high hydroperiod soils; it is frequently found in standing water. Selective logging of the swamp hardwood overstory probably would effect it little. Clear cutting might raise the flood level to a dangerous degree.

Drainage of the swamps it frequents would eliminate the species. No comments are available as to whether livestock browse the twigs. In fact little recent information is available. In 1949 Steyermark commented that material he borrowed from the four largest U.S. herbaria contained a total of only 19 herbarium sheets comprising but 10 different collections with most of these made more than one hundred years earlier.

References

- Small, J. K. 1933. Manual of the Southeastern Flora. 924.
- Steyermark, Julian A. 1949. Lindera Melissaefolia.
Rhodora 51, no. 608: 153-162.
- Tucker, G.E. 1974. Lindera mellissaefolium in Arkansas. Rhodora 76:525.

SPECIES: #99 Lindera melissaefolium (Walt.) Blume. Jove's-fruit

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X				
Damage			X			X		
No Lasting Effect	NA				X		NA	?
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Lindera melissaefolia (Walt.) Blume



245
LAURACEAE!

[1-2]
Litsea aestivalis (L.) Fern. Pond spice, pond-bush
Glabraria geniculata (Walt.) Britton

Technical Description

Glabrous, deciduous shrub to 3 meters tall.

Stems.--The twigs slender, pale-brown, zig-zag, the branches spreading, the bark of new shoots reddish-brown, sometimes tomentose at first.

Leaves.--Alternate, spreading on short slender petioles 5 mm long or less, the blades leathery (somewhat like small leaves of willow-oak), lanceolate to oblong or oblanceolate, mostly 1.5-4.0 cm long, rarely wider than 1.0 cm the tips acute to narrowly or broadly rounded, the margins entire, slightly thickened, the bases acute or acuminate, yellow-green and smooth save for villosity (spreading, long, crisped hairs) along the midrib beneath (sometimes also on the petiole). Winter buds ovoid, valvate, to about 3 mm long, stalked, solitary or paired at the branch tips or from spur tips, these expanding to form cup-like involucre below the small umbels of male or female flowers.

Flowers.--With mostly 6, spreading, yellow sepals, these broadly elliptic-oblong or obovate ca. 3.0-3.5 mm long. Stamens mostly 9, the anthers with 4 valves (flaps), opening inward or laterally. Female flowers with 1 superior ovary, this surrounded by usually 9 short, fleshy staminodes.

Fruit.--One to four, on stalks (pedicels) to 4 mm long, these jointed to peduncles (inflorescence stalks) about as long; body of drupe nearly round, 4-6 mm long, minutely roughened, red.

Distribution and Flowering Season

Bay heads, edges of sandy sinks, meteor ponds, and pocosins, very uncommon, in the Coastal Plain from North Carolina south to northern Florida and southwestern Georgia.

Special Identifying Features

Superficially similar to Lindera spp. but differing in having 4 anther flaps (versus 2 for Lindera), in its smaller, rounder fruit, and in its much smaller and more leathery, narrower leaves. The twigs and foliage lack spicy odor.

Habitats and Management Implication

This is definitely a species of wet, sandy or peaty, quite acid soils. Like Lindera, it may form thickets and thus, while spotty in distribution, may be abundant locally. Common associated woody species would be Red Bay, Virginia Bay, Gallberry, Myrtle, various heaths, Pond Pine, Pond Cypress, Loblolly Bay. Clear cutting of the merchantable species would probably favor this plant. Burning would not effect it adversely in that, like most species of bogs and pocosins, it would respond vigorously with new shoots. Site preparation involving removal of brush would of course eliminate it, unless done in strips. Greatest difficulty for a species with high soil moisture requirements such as this one is through drainage of the habitat.

References

Small, J. K. 1933. Manual of the Southeastern Flora. 921, 923.

Britton, N. L. & A. Brown. 1913. Illustrated flora of North eastern U. S. Canada & British Possessions. Vol. II: p. 135.

Fernald, N. L. 1945. Botanical specialities of the Seward Forest and adjacent areas of Southeastern Virginia. Rhodora 47: 94-142.

SPECIES: #101 Litsea aestivalis (L.) Fern. Pond spice; pond bush

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X			X		
No Lasting Effect	X							?
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Litsea aestivalis (L.) Fern.



Paper 100
Text & map by:
100 Robert Kral

245
LAURACEAE

Persea humilis Nash. Dwarf red bay persea, redbay persea
P. borbonia (L.) Spreng. var. humilis (L.) Kopp

Technical Description

Evergreen shrub or small tree with pungently aromatic twigs and foliage.

Stems.--The ascending primary branches numerous and rebranching from near the base, thus the plants bushy with full crowns. Twigs slender but stiffish, reddish, densely appressed-hairy. often lustrous.

Leaves.--Spreading or ascending on angled, appressed-hairy petioles to 2 cm long, the blades lanceolate to elliptic or (rarely) obovate, mostly 4-10 cm long, acute but the tips narrowly rounded, the margins slightly revolute and cartilaginous edged, entire, the bases cuneate, the upper surface yellow-green and smooth, shining, the lower surface lustrous, reddened or bronzed with minute, appressed hairs.

Inflorescence.--Flowers clustered in umbel-like tight cymes, the pedicels silky hairy, the cymes on stiffish, ascending, hairy stalks on new shoots.

Flowers.--Sepals 6 in 2 series, the surfaces silky-hairy. Outer sepals 3, joined at base, ascending about 2 mm long, ovate; inner sepals more spreading, oblong, ca. 3.0-3.5 mm long, yellowish-green. Stamens usually 9, more or less erect, the filaments hairy, the anthers with 4 valves (flaps). Stamens fleshy. Ovary 1, superior with a single style and stigma button.

Fruit.--Drupes broadly ovoid or (mostly) globose, nearly black when ripe and with a slight bloom, about 1 cm. long.

Distribution and Flowering Season

Sandhills scrub, peninsular Florida, particularly in the central highlands with outliers north as far as southern Georgia. Flowering mostly in early summer, but intermittently all year.

Habitats and Management Implication

This species is part of the sand-pine evergreen scrub oak forest type and is therefore found on deep, fine-textured sands these very often what remains of ancient dunes. Occasionally it is also to be found, with Ceratiola, in open stands of longleaf pine-turkey oak. Associated shrubby species are shrub heaths (Lyonia) hollies, Ceratiola, palmetto, shrub oaks. Evergreen oaks, Florida hickory, Osmanthus, and sand pine mark the overstory where it is present. The sandhills it frequents have historically been subjected to fire, but not as frequently as the often adjacent longleaf pineland. In any event, most of the scrub species, of which this is a part, respond by prolific sprouting and often increase in contrast to the sand pine and Ceratiola which have to reseed such burned areas (the former through opening of charred, serotinous cones).

Clear cutting of the pine in the overstory without disturbance of the substratum would increase this species and other non-commercial scrub evergreens. Root plowing, chaining, windrowing and other methods of site preparation for

pine would of course eliminate scrub species such as P. humilis. Burning is not recommended in this forest site type.

The taxonomic distinctness of this species has long been debated, many workers considering it but a variety of P. borbonia. Current work involving study of epidermal characters together with flavonoid analysis done by Dr. E. P. Wofford support the thesis that it is a taxon distinct from, though perhaps derived from, P. borbonia in recent geologic time.

References

1. Small, J. K. 1933. Manual of the Southeastern Flora. 921-922.
2. Wofford, E. P. 1974. The systematic significance of flavonoids in Persea of the southeastern United States. Biochem. Syst. and Ecol. 2 88-91.
3. _____ 1975. An SEM study of leaf surface pubescence in the southeastern taxa of Persea. With R. W. Pearman, Sida 6 (1): 19-23.

SPECIES: #100 *Persea humilis* Nash, Redbay *persea*

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect	NA							
Beneficial if Done Properly					X	X		??

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Persea humilis Nash



245
BRASSICACEAE

→ Arabis perstellata Braun, prairie rock-cress
[21.]

Technical Description

Perennial, arising from overwintering rosettes, these forming as slender leafy shoots from bases of previous years' stems.

Stems.--At flowering time erect or ascending, but from decumbent bases, one to several from withering rosettes, 1-8 dm long, terete, pale yellow-green with abundant white-stellate hairs.

Leaves.--Of rosettes and sterile leafy shoots long-petiolate, blades mostly obovate or oblanceolate, 4-15 cm long, apically acute to broadly rounded, the margins ranging from lyrate-pinnatifid (in earliest, oldest rosette leaves) with lowest segments linear, to coarsely dentate, serrate-dentate, saliently narrowly toothed or nearly entire, in any event narrowing attenuately to nearly the petiole base, thin, the surfaces yellow-green, with the upper and lower both evenly stellate-puberulent. Stem leaves abruptly shorter, the smallest lowest, the largest at mid stem or above, mostly oblong, narrowly elliptic, or oblanceolate, apically narrowly to broadly acute, the margins from nearly entire to closely or distantly toothed or denticulate or (in lowest) pinnatifid, the bases auriculate clasping, the surfaces as in the rosette leaves.

Inflorescence.--Upper 1/2 to 1/3 of stem naked, developing into a variously elongating raceme. Flowers symmetrical, on spreading, slender but stiffish, stellate-hairy pedicels to 4 mm long.

Flowers.--Sepals 4, ascending or spreading, oblong-lanceolate, boat-shaped, 2-3 mm long, the backs stellate-hairy, pale green with tints of lavender. Petals 4, clawed with elliptic, erose blades, 3-4 mm long, ascending, the blades pale lavender with deeper colored veins, the claws white. Stamens 6, 2 shorter, filaments flattened and ascending, anthers yellowish, oblong, ca. 0.5 mm long, erect.

Fruit.--On spreading stalks that elongate with age fully to 1 cm or more, linear, straight, to 2 cm long, about 1 mm broad, longitudinally parallel-veined, flattened between the seeds, the surfaces with a mixture of simple and stellate hairs. Seeds oblong, ca. 1 mm long, somewhat flattened, reddish-brown, wingless, the coat in places minutely hairy.

Distribution and Flowering Season

There are two varieties, both extremely local. The var. perstellata is found on wooded hillsides along Elkhorn Creek in Franklin County, Kentucky. Its fruiting stems may reach 4 dm, its larger leaves with blades rarely longer than 4 cm. The variety ampla Rollins, is much taller, ranging from 4 to 8 dm and with larger, broader, basal rosette leaves (8-15 cm long). So far, this variety is known only from a single calcareous bluff system above the Stones River (this place now Percy Priest Lake, a Corps of Engineers project), northeast of Una, in Davidson County, Tennessee. Both varieties flower in April and May.

Special Identifying Features

Both varieties may be confused with A. shortii (Fern.) Gl., but that species has upper surfaces of leaves either smooth or with simple hairs, shorter stalked fruit, and smaller, whitish or very pale pink petals.

Habitats and Management Implication

Both varieties are found on blackish, clay loams over limestone, on limestone ledges, or amidst limestone boulders in the shade of a hardwood forest (sometimes with a few junipers) made up mainly of various oaks, ash, hickory, redbud, sugar maple and Rhus. Associated herbs are mostly spring flowering perennials such as Dentaria, Hepatica, Phacelia pinnatifida, Hydrophyllum macrophyllum, etc. Arabis laevigata is local throughout. Braun (1940) indicates that A. perstellata and A. laevigata will hybridize, but no such observations thus far have been made in Tennessee.

In that the plants are in steep, wooded hillsides and bluffs, the habitats would be modified drastically by clearcutting, through admission of light, drying, and erosion during the wet cycles. Careful logging involving single tree or group selection might have the least impact. However, the total area occupied by both varieties is so small and the habitats so sensitive that every effort should be made to preserve them intact. The Tennessee population has been reduced through a damming up of the Stones River, thus inundating the lower reaches of the bluffs it frequents.

Selected Readings

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1956. Growth habits of Arabis perstellata. *Rhodora* 58:292-295.
- Gleason, H. A. 1952. Change of name for certain plants of the "Manual Range." *Phytologia* 4:20-25.
- Hopkins, M. H. 1937. Arabis in eastern and central North America. *Rhodora* 39:167-170.
- Rollins, R. C. 1960. Arabis perstellata in Tennessee. *Rhodora* 62:242-244.

Revised March 1980

SPECIES: #41 Arabis perstellata Braun; prairie rock-cress

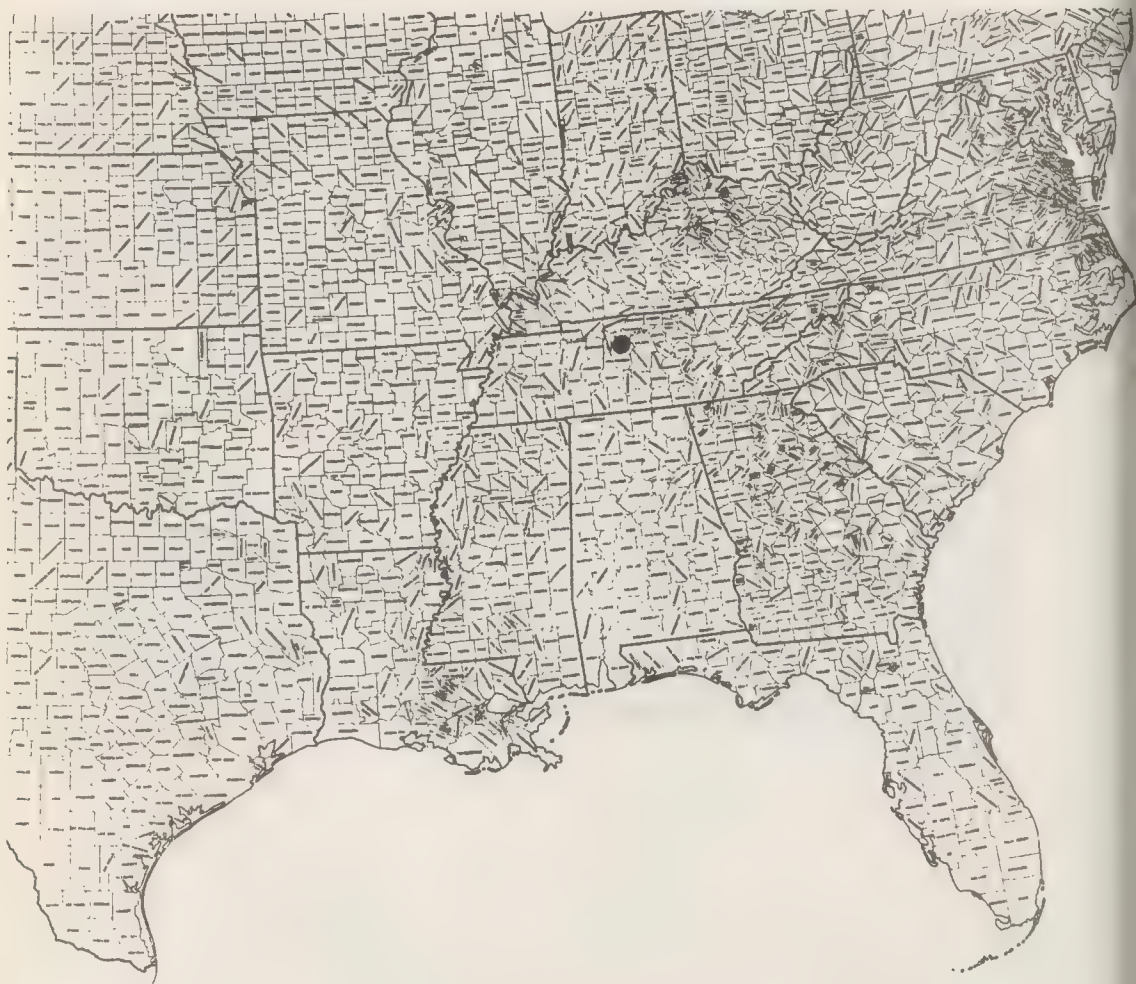
Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy						X		X
Damage	NA						NA	
No lasting effect					X			
Beneficial if done properly								

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Arabis perstellata Braun var. ampla Rollins



Arabis perstellata Braun var. perstellata



BRASSICACEAE:

→ Draba aprica Beadle, open-ground whitlow-grass

Technical Description

Taprooted winter annual.

Stems.-- 0.3-3.5 dm high, rarely branched below the middle, soft, slender but stiffly erect, terete, low-ribbed, toward the base purplish, at mid-stem and above greenish, throughout stellate-pubescent, the hairs whitish.

Leaves.-- Both rosette and cauline produced. Basal leaves spatulate to elliptic, ovate or suborbicular, the tips obtuse to rounded, the margins entire to few-and-low toothed (2-4 pairs), the bases gradually or abruptly attenuated to definite, spreading petioles; stem leaves alternate, spirally arranged, distant or slightly overlapping, erect, sessile or short-petiolate, the blades mostly oblong, elliptic-linear or broadly linear, the largest (to 2.5 cm long) toward the stem base, gradually reduced in size and tending to be entire upward toward and in the inflorescence.

Inflorescence.-- Racemose, often with short indeterminate racemes born from axils of most upper leaves but the longest terminal, elongating (in robust plants) to 3-5 cm; pedicels at anthesis ca. 2-3 mm long, spreading-ascending, elongating in fruit to 4-5 mm, and becoming rather distant as the raceme elongates.

Flowers.-- Regular, bisexual; sepals 4, erect, distinct, oblong-cymbiform 0.8-1.0 mm long, yellowish-green, tending to fall early from the young fruit, the backs stellate-pubescent; petals 4, erect to somewhat spreading, 2.2-2.5 mm long, clawed, white, the blades broadly ovate or obovate, the apex rounded, the base attenuated gradually or abruptly to the claw; stamens 6, 2 shorter, all shorter than the petals, the filaments white, slender, the nearly round anthers yellow; ovary 2-carpellate, oblong, laterally flattened parallel to the partition, superior, green, stellate-pubescent, the style to 0.2 mm long. Fruit.-- Siliques linear-elliptic, 4-6 mm long, stellate-hairy. Seeds (2-) (4-6) (-8), flat, asymmetrically triangular, brown, ca. 1 mm long, borne in 2 (opposite) rows.

Distribution and Flowering Time

Shallow, usually highly sandy soils over arenaceous (siliceous) rock, very local, Piedmont South Carolina and Georgia; Ozarks of Arkansas; southeastern Missouri, eastern Oklahoma. Flowering April into June.

Special Identifying Features

D. aprica is taxonomically nearest D. brachycarpa Nutt. ex T. & G. but differs in the dense stellate-hairiness of its fruit. The two species grow together on the summit of Kennesaw Mountain in Georgia (the type locality) and it can be seen there that D. brachycarpa is first to bloom, mostly being in full fruit by the time flowers of D. aprica are full. As is true of several Draba, D. aprica flowers are petaliferous during the early period of flowering but tend to lack them later in the flowering season.

Habitat and Management Implications

D. aprica frequents organic sands of shallow soils over siliceous rock (mostly granites or sandy shales). These soils are subject to rapid drying, are often covered by mosses, lichens annual grasses and annual forbs such as Krigia virginica, Viola rafinesquii, Arabidopsis, Plantago virginica, etc. The plants are either in full sun or are in the light shade of Rhus, Forestiera, Prunus, Juniperus, certainly not in closed forest. The over-story is primarily oak-hickory-pine, with oaks (Q. stellata, Q. marilandica, Q. falcata, Q. coccinea, Q. prinus) predominant. Soils on which this Draba succeeds are usually too thin to support large trees, the cover thus being a scattering of shrubs including (in addition to those already mentioned) Amorpha, Vaccinium arboreum, Chionanthus, Celtis tenuifolia, etc. While fire is part of the vegetational history of this type, no observations have been made as to how this factor would effect the abundance of D. aprica. Evidently succession to total forest cover would shade it out. The species is small, perhaps its small size and the very local nature of its populations being the reasons for its declared rareness. Whenever this species has been observed over time it persists, even though annual, but appears to spread very little.

References

- Fernald, M.L. 1934. Draba in temperate northeastern America. Rhodora 36: 361-363
- Small, J.K. 1913. Flora of the southeastern U.S., ed. 2 1136-1375
- _____. 1933. Manual of the southeastern Flora, pp. 565-566, Chapel Hill, N.C.
- Radford, A.E., H.E. Ahles and C.R. Bell, 1968. Manual of the vascular flora of the Carolinas, pp. 489-490. Chapel Hill, N.C.

SPECIES Draba aprica Beadle. open ground whitlow-grass

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			X	not
Damage								obs.
No Lasting Effect								
Beneficial if Done Properly	?				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Draba aprica Beadle



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BRASSICACEAE;

Leavenworthia Torrey [^] Glade-cress
[C-1]

The description below is generalized for Leavenworthia and will apply to all endangered or threatened species.

Smooth (usually low) taprooted annual herbs usually from winter rosettes.

Leaves.--First leaves of a rosette usually simple with long, slender petioles and broad but small blades, those developing later becoming pinnatifid with the terminal lobe largest (often broader than long) and with the lateral pairs of segments mostly opposite, few to many, and of various outlines from narrowly linear to broadly triangular or oblong, ovate, obovate or round, and with leaflet margins from entire to toothed or lobed.

Inflorescence.--First flowers on erect simple stalks, usually several from a rosette. Later, flowers usually in loose racemes from true stems from axils of rosette leaves.

Flowers.--Nearly or entirely actinomorphic, usually open only on sunny days, the ones in racemes with pedicels longer than the flowers by anthesis. Sepals 4, erect or spreading or with spreading tips, mostly linear or narrowly triangular, green or tinged with purple or red. Petals 4, mostly spreading apically, longer than sepals, obovate or lingulate (tounge-shaped), mostly white with yellow bases (eye), or yellow with orange bases, or lavender with orange or yellow bases. Stamens 6, 4 longer. All flowers have a sweet, nearly overpowering fragrance.

Fruit.--A silique either flattened parallel to the septum (partition) or nearly to quite round in cross section. Seeds in 1 row, flattened, winged or nearly wingless, from nearly round to longer than broad.

Habitat and Management Implications

All Leavenworthia on the threatened and endangered lists have the following site preferences:

1. They are plants of full sun.
2. They occur on flat-bedded outcrops of limestone or on the shallow soils derived therefrom, commonly in what are called limestone glades or cedar glades. They are part of an early plant successional stage that leads to occupancy by Juniperus and finally to mixed hardwoods, these last mostly oaks, hickories, elms, and ash. The limestone habitats are in a climate regimen that makes them very wet during late winter and early spring, droughty during summer and fall. All species treated here are found within an area extending from middle and western Kentucky southward through Tennessee into northern Alabama and northwestern Georgia except for one that is found in southeastern Oklahoma and eastern Texas. The greatest concentration of species is in the limestone barrens of middle Tennessee.
3. They all are very restricted in total range but may be aspect dominant locally.

4. All bloom in early spring, are in fruit by late spring and have almost completely dried and gone by early summer.

5. The primary threat faced by most Leavenworthia species relates to the conversion of the limestone barrens to housing or industrial development, or to improved pasture. Development for housing or industrial use will destroy the habitat. In the case of development for improved pasture, such winter annuals as these do not compete well with bluegrass, fescue, bermuda grass or any other of the forage or hay grasses which, in good pasture, assume dominance. Such is not the case in unimproved or overused pasture, where exposures of substrate are usually covered with leavenworthia and other glade annuals.

As stated above, Leavenworthia is part of an early successional stage which usually gives rise to Juniperus subclimax. It will persist for a time in clearings where stocking is incomplete, but is lost in any area where shade is complete. Clearcutting of juniper or other forest cover that re-exposes mineral earth or outcrops promotes reoccupancy by Leavenworthia, providing there are contiguous seed sources. Glade cress is frequently abundant in areas such as powerline clearings where the forest cover has been removed completely, just as it sometimes is abundant in abandoned croplands within the range of the species.

References

- Rollins, R.C. 1963. The evolution and systematics of Leavenworthia (Cruciferae). *Contribs. Gray Herb.* CXCII: 3-98.
- Small, J.K. 1933. *Manual of the Southeastern Flora*, pp. 569-470. Chapel Hill, N.C.

245
BAPSIACEAE:→ Leavenworthia alabamica Rollins var. alabamica [E. J.] Glade cress

Technical Description

Leaves.--Larger rosette leaves rarely longer than 1 dm. long, oblanceolate, the terminal segment sometimes round but more often reniform (broader than long), usually coarsely dentate or crenate; lateral segments usually several pairs, mostly asymmetrical, from broadly to narrowly triangular (often with tip pointing upward or downward) or obovate, entire or variously toothed or lobed, and with leaflet pairs progressively reduced in size and more distant on the rachis downward.

Flowers.--Sepals mostly oblong, 5-7 mm. long, spreading at flowering time, pale green with tints of maroon. Petals obovate-bladed, 1.0-1.4 cm. long, spreading at anthesis, the blade white to pale lavender, deeply emarginate, the base (including the short claw) yellow or orange yellow.

Fruit.--Silique narrowly oblong, not fleshy, acute above and below, strongly flattened, 1.5-2.5 cm. long, 3.0-4.5 mm. wide; style 2.5-5.5 mm. long. Seeds dark brown, orbicular, winged, 3-4 mm. in diameter.

Distribution and Flowering Season

Open limestone glades and heavy soils of open fields derived from limestone, northwestern Alabama from central Colbert and Franklin counties eastward to middle Lawrence county. Flowering from late February through April.

Special Identifying Features

In flower this species resembles L. torulosa, L. exigua or white or lavender flowered forms of L. stylosa. It differs from the first by not having a torulose ovary and fruit; it differs from the second by its longer (10-16 mm. versus 7-10 mm.) petals which are more deeply emarginate; it differs from the third in its shorter (6-12 mm. vs. 12-25 mm.) flatter, less fleshy siliques. This is perhaps the showiest and most abundant of the genus in Alabama.

Leavenworthia alabamica Rollins



BRASSICACEAE

Leavenworthia alabamica Rollins var. brachystyla Rollins
~~Short-styled glade-cress~~

Technical description

Technical Description for type variety (L. alabamica Rollins alabamica)

Leaves: Larger rosette leaves rarely longer than 1 dm. long, oblanceolate, the terminal segment sometimes round but more often reniform (broader than long), usually coarsely dentate or crenate; lateral segments usually several pairs, mostly asymmetrical, from broadly to narrowly triangular (often with tips pointing upward or downward) or obovate, entire or variously toothed or lobed, and with leaflet pairs progressively reduced in size and more distant on the rachis downward.

Flowers: Sepals mostly oblong, 5-7 mm. long, spreading at flowering time, pale green with tints of maroon. Petals obovate, 1.0-1.4 cm. long, spreading at anthesis, the blade white to pale lavender, deeply emarginate, the base (including the short claw) yellow or orange yellow.

Fruit: Silique narrowly oblong, not fleshy, acute above and below, strongly flattened, 1.5-2.5 cm. long, 3.0-4.5 mm. wide; style 2.5-5.5 mm. long. Seeds dark brown, orbicular, winged, 3-4 mm. in diameter.

Distribution and Flowering Season

Variety brachystyla is found only in Morgan County glades (Alabama) whereas the var. alabamica has its eastward extension in middle Lawrence County, the county just to the west. While the plants are locally abundant, they occur only in 5 small areas so far as is known. According to Rollins (1963) this variety has arisen through first spatial isolation, then a trend toward self-compatibility.

Special Identifying Features

Similar to the type variety but styles shorter (1.5-3.0 mm. versus 2.5-5.5 mm.), and siliques rounded above and below (rather than acute above and below).

Revised March 1980

#11 *Leavenworthia alabamica* Rollins var. *brachystyla* Rollins;
 SPECIES: Short-styled glade-cress

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect	NA	NA	NA	NA				X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Leavenworthia alabamica var. brachystyla Rollins



245
BRASSICACEAELeavenworthia aurea Torr. Golden glade-cress [2]

Technical Description

Glabrous, rosulate, taprooted winter annual.

Leaves.--Strictly basal, usually numerous, mostly 5-10 cm long, spreading, the slender, elongated petioles often purplish-tinged toward the abruptly dilated clasping base, the blades rather fleshy, either simple, broadly elliptical to ovate, suborbicular or reniform, or variously lyrate-pinnatifid, with the terminal segment similar to the simple blade, the lateral segments few to many, mainly broadly to narrowly triangular, often asymmetrical and often decurrent to form a variously broadened wing between segments; blade or segment margins entire to low-dentate or angulate; leaf surfaces pale green on both sides.

Inflorescence.--Scapes erect or spreading-ascending, terminating in a single flower or loosely racemose, in total length from 8-20 cm; raceme indeterminate, rarely compound, bractless, the slender ascending pedicels much elongating from bud to fruit.

Flowers.--Regular, bisexual, very sweetly fragrant, opening fully only on sunny days, closing at night or when shaded; sepals 4, distinct, cymbiform (boat-shaped), ca. 4 mm long, erect or ascending, pale yellow-orange, sometimes maroon-tinted toward base; petals 4, distinct, 7-8 (-10) mm long, the erect claw 2-3 mm long, the obtriangular, shallowly emarginate blade spreading-ascending, clear yellow, tinged with orange toward the base; stamens 6, distinct, erect, strongly tetradynamous (2 distinctly shorter), the longer ones ca. 5 mm long, the filaments strongly flattened, yellow, tapering into basifixed, introrse, ellipsoidal, yellowish anthers ca. 1 mm long; gynoecium at anthesis ca. 5 mm long, the narrowly ellipsoidal-cylindric ovary ca. 3 mm long, the style fleshy, the stigma narrowly discoid, papillose.

Fruit.--Siliques strongly flattened, parallel to a complete septum, oblong, 1.5-3.0 cm long (including style), ca. 5 mm wide, the margins straight or at intervals somewhat constricted, the persistent style ca. 3 mm long, the ripe valves straw-colored, raised-reticulate-veined. Seeds 5-11/fruit, strongly flattened, dark brown, ca. 4 mm wide, suborbicular, but truncated at the funicular end, otherwise narrowly winged with a wing ca. 0.5 mm broad.

Distribution and Flowering Season

Seasonally wet limestone glades, southeastern Oklahoma and eastern Texas (San Augustine Co.); flowering from late February into April.

Special Identifying Features

Leavenworthia aurea is taxonomically closest to L. exigua lutea, a resemblance strikingly apparent to any who have seen both in the field. Both have small yellow flowers, the petals of which are shallowly emarginate; both have flattened fruit and very similar foliage. The essential differences are that L. aurea has a somewhat thicker fruit with strong margins and a longer style, and terminal leaf segments that are more rounded, fleshier. L. aurea has a haploid chromosome number of 24; L. exigua lutea has $n = 11$.

Habitat and Management Implications

L. aurea is a typical open limestone glade plant, thus is part of an ecological system very similar to that occupied by most of the other species of Leavenworthia that range east of the Mississippi. It abounds locally on thin, clay or clay loam sites over flat-bedded limestone, usually in areas where shallow water flows or pools in winter and spring, but which tend to dry by late spring or summer. Nostoc balls are frequent over the surface of the substrate, and the associated genera (often species) are much the same as those of eastern Leavenworthia, namely Arenaria (mostly patula), Lesquerella, Talinum, Sedum (mostly S. pulchellum), Senecio, Delphinium (mostly D. virescens), Penstemon, Satureja (mostly S. arkansana), Euphorbia, Scutellaria, Linum (frequently L. pratense), Verbena, Baptisia (mostly B. australis), B. sphaerocarpa, Nothoscordum, Allium, etc. Opuntia is common. Zygadenus nuttallii is frequent, as are Lindheimera texana, Stipa leucotricha. Isoetes butleri is frequent in the shallow pools, together with Callitriche, Gratiola, Lindernia. Succession is much the same as it is in eastern glades, early stages involving reproduction of Juniperus with a scattering of Ulmus (mostly U. crassifolia), Rhamnus, Forestiera, Quercus, Diospyros, etc. Ultimately the Juniperus gives way to the hardwoods which make up the climax forest. Historically such glades (as in Tennessee) were probably kept open through natural fires, periodic drought, which would reduce woody competitors and promote exposure of limestones by erosional forces.

L. aurea is primarily threatened by real estate development as the numerous towns within its range expand, by conversion of some of its area to "improved" pasture or to crop agriculture, both these latter activities usually involving alteration of the intermittent flow of water over the glades in winter or spring. Since the plants are sun plants, any land development that promotes successional direction toward forest will reduce their suitable area.

References

Rollins, R. C. 1963. The evolution and systematics of

Leavenworthia (Cruciferae). Contribs. Gray Herb. of Harvard Univ. No. CXCII: 1-98.

Torrey, John. 1837. An account of several new genera and species of North American plants. Ann. Lyc. Nat. Hist. 4: 80-94.

SPECIES Leavenworthia aurea Torr. golden glade-cross

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		NA	NA	NA			X	
Damage								
No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: drainage of the seasonally moist sites would be deleterious

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Leavenworthia aurea Torr.



245
BRASSICACEAE

→ Leavenworthia crassa Rollins var. crassa [2],
~~fleshy-fruited glade-cress~~

Technical Description

Leaves.--Earliest leaves entire or shallowly toothed; largest leaves of fully grown plants lyrate pinnatifid, 3-8 cm long, with the terminal lobe 0.5-2.0 cm broad.

Flowers.--Sepals linear-oblong, 5.0-6.5 mm long, spreading. Petals obovate to spatulate, deeply emarginate, 9-14 mm long, yellow with orange claw or white with yellow claw, blades spreading.

Fruit.--Siliques fleshy, globose to oblong, 6-12 mm long, 3.5-6.0 mm wide, 2.5-5.0 mm thick; styles 2.5 - 6.0 mm long. Seeds 2-8 per fruit; dark brown, winged, nearly round.

Distribution and Flowering Season

Limestone glades in southeastern Lawrence and southwestern Morgan counties, Alabama. Locally abundant in a few localities within this small range.

Special Identifying Features

The species Leavenworthia crassa is distinguished from other Leavenworthias with emarginate petals by its non-torulose, fleshy siliques. This separates them from nearby populations of L. alabamica. It is similar in some respects of flower and fruit to L. stylosa, a species of middle Tennessee, but differs in its shorter (6-12 mm versus 12-25 mm long) siliques. It has the longest styles in relation to body length.

Revised March 1980

#12 *Leavenworthia crassa* Rollins var. *crassa*
SPECIES: Fleshy-fruited glade-cress

Expected effect on the species*	Management Practices							
	Prescribe burn	Buildoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy							X	
Damage								
No lasting effect	NA	NA	NA	NA				X
Beneficial if done properly					X	X		

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the species and/or knowledge gained from personal field observations. Estimates are made to any instances. Results of practice may be modified by the degree of application, intensity of treatment, weather to plant condition, etc. A management practice for which no entry is made is judged to be of no value. Information from which to predict expected results. As data are gathered in the field by users of the data, the expected effect will be refined.

Revised March 1980

Leavenworthia crassa Rollins var. crassa



245
BRASSICACEAE;

→ Leavenworthia crassa Rollins var. elongata Rollins [1-3].
~~Falkville glade-cress~~

Special Identifying Features

As in the type variety but siliques with a longer range (8-12 mm. long versus 6-10 mm. long) and with petals consistently yellow (versus white to yellow in type variety) and 9-11 mm. long rather than 10-13 mm. long.

Distribution and Flowering Season

Known only from Southeastern Morgan County, Alabama (4 localities, all small).

Revised March 1980

#13 Leavenworthia crassa Rollins var. elongata Rollins;
SPECIES: Falkville glade-cress

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect	NA	NA	NA	NA				X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Leavenworthia crassa var. elongata Rollins



BRASSICACEAE

Leavenworthia exigua Rollins var. exigua Glade cress

[1]

Technical Description

Leaves.--Early leaves with a remote, shallowly toothed terminal lobe, fully developed leaves lyrate-pinnatifid (see genus description), 1.5-6 cm. long, the lobes with varied margins.

Flowers.--Sepals linear-oblong, 3.5-5.5 mm. long, greenish or with lavender tints, erect or spreading in full flower. Petals spatulate to tongue-shaped, shallowly emarginate, 6-9 mm. long, 3.0-4.5 mm. wide, blade white to light lavender, the "eye" spot yellowish or petals yellow in the variety lutea.

Fruit.--Siliques very flattened, non-fleshy, oblong, 1-2 cm. long, 3.5-5.5 mm. wide, obtuse above and below, the style 1-3 mm. long. Seeds 4-10/silique, winged, nearly flat, unevenly round, 3-4 mm. broad.

Distribution and Flowering Season

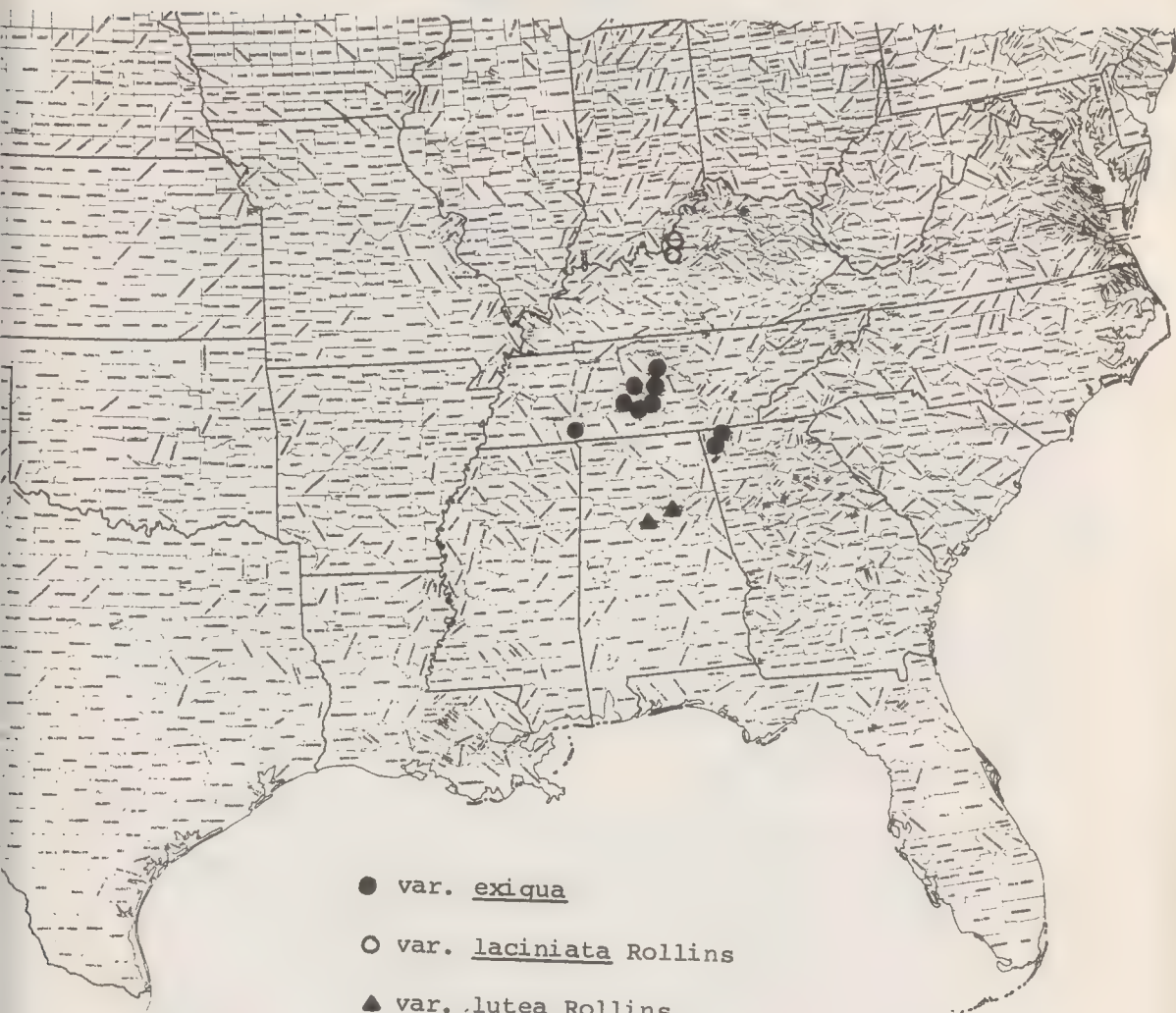
Local in limestone glades in the Central Basin of Tennessee and in northwest Georgia.

Special Identifying Features

This species differs from other emarginate-petalled Leavenworthia as follows;

1. Petal blades shallowly emarginate, petals 7-10 mm. long, styles 1-3 mm. long. This eliminates L. stylosa, L. crassa, L. alabamica which have longer and more deeply emarginate petals, longer styles.
2. Siliques thin, without margins. This eliminates the species L. aurea which occurs only in Oklahoma and eastern Texas.
3. Fruit not torulose. This excludes L. torulosa, whose fruit is constricted between the roundish seeds.

Leavenworthia exigua Rollins



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BRASSICACEAE

→ Leavenworthia exigua Rollins var. laciniata Rollins [1-3],
~~Shepherdville glade-cress~~

Technical Description

Technical Description for type variety (L. exigua Rollins var. exigua)

Leaves: Early leaves with a remote, shallowly toothed terminal lobe, fully developed leaves lyrate-pinnatifid (see genus description), 1.5-6 cm. long, the lobes with varied margins.

Flowers: Sepals linear-oblong, 3.5-5.5 mm. long, greenish or with lavender tints, erect or spreading in full flower. Petals spatulate to tongue-shaped, shallowly emarginate, 6-9 mm. long, 3.0-4.5 mm. wide, blade white to light lavender, the "eye" spot yellowish or petals yellow in the variety lutea.

Fruit: Siliques very flattened, non-fleshy, oblong, 1-2 cm. long, 3.5-5.5 mm. wide, obtuse above and below, the style 1-3 mm. long. Seeds 4-10/silique, winged, nearly flat, unevenly round, 3-4 mm. broad.

Distribution and Flowering Season

This variety is confined to Bullitt County, Kentucky and is thus far known from but one locality (open field, Ridge Road, 27 Mar. 1954, H. A. Korfhage 2). It is not known whether this variety has persisted but every effort should be made to preserve it in this, the only known place for it. However the site is a field, not a glade and in such places these species persist more through disturbance than through a lack of it.

Special Identifying Features

As in the type variety but styles 2-3 mm. long and sepals green (versus styles 1-2 mm. long and sepals tinted with lavender).

Revised March 1980

#15 Leavenworthia exigua Rollins var. laciniata Rollins;
SPECIES: Sheperdville glade-cress

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect	NA	NA	NA	NA				X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

245
BRASSICACEAE

Leavenworthia exigua Rollins var. lutea Rollins [?].
Pasture glade-cress

Technical description

Technical Description for type variety (L. exigua Rollins var. exigua)

Leaves: Early leaves with a remote, shallowly toothed terminal lobe, fully developed leaves lyrate-pinnatifid (see genus description), 1.5-6 cm. long, the lobes with varied margins.

Flowers: Sepals linear-oblong, 3.5-5.5 mm. long, greenish or with lavender tints, erect or spreading in full flower. Petals spatulate to tongue-shaped, shallowly emarginate, 6-9 mm. long, 3.0-4.5 mm. wide, blade white to light lavender, the "eye" spot yellowish or petals yellow in the variety lutea.

Fruit: Siliques very flattened, non-fleshy, oblong, 1-2 cm. long, 3.5-5.5 mm. wide, obtuse above and below, the style 1-3 mm. long. Seeds 4-10/silique, winged, nearly flat, unevenly round, 3-4 mm. broad.

Distribution and Flowering Season

The var. lutea is known only from St. Clair and Jefferson counties in Alabama, from a total of perhaps six localities.

It is found on heavy clay soils around very localized outcrops of massive dolomitic limestone and on the shallow soils of cracks in the outcrops themselves. Invariably the sites are in pasture and/or grazed, the plants persisting in spite of considerable trampling by cattle.

Special Identifying Features

As in the type variety but petals golden yellow.

Revised March 1980

SPECIES: #16 Leavenworthia exigua Rollins var. lutea Rollins;
Pasture glade-cress

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect	NA	NA	NA	NA				X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

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BRASSICACEAE
[1-3]
Leavenworthia stylosa Gray, Glade Cress

Technical Description

Leaves.--Fully grown leaves lyrate pinnatifid, the terminal lobe largest, usually broader than long, the lateral lobes varied in number and margin.

Flowers.--Sepals linear-oblong, spreading at flowering time, 4-8 mm. long, greenish or with tints of maroon. Petals obovate to broadly spatulate, 9-15 mm. long, deeply emarginate, the blades white, yellow (mostly) or lavender, the claws deep yellow or orange, the blades spreading broadly at full flower.

Fruit.--Siliques oblong to linear, 1-3 cm. long, 2.5-4.5 mm. broad, 2-4 mm. thick, the body obtuse above and below, fleshy, on an evident stalk (gynophore) to 1 mm. long; style 3-8 mm. long. Seeds dark brown, winged, broadly oblong to suborbicular, 3.0-4.5 mm. long.

Distribution and Flowering Season

Locally abundant in the Central Basin of Tennessee in limestone glades and calcareous fields. Commonest in Davidson, Rutherford and Wilson Counties, areas of Tennessee in which limestone glades are best developed.

Special Identifying Features

Distinguished by its large (comparatively) deeply emarginate mostly yellowish petals, by its comparatively elongate siliques which while somewhat compressed are also fleshy, and its elongate styles.

Habitats and Management Implication

In some glades an early spring aspect dominant, covering acres with a carpet of golden-yellow, very fragrant blooms. Some of the greatest concentrations of this species have been lost through the damming up of the Stones River, subsequent development of lakeshore estates, and through expansion of the cities of Nashville, Murphreesboro, and Smyrna.

Leavenworthia stylosa Gray



245
BRASSICACEAE!

II-8.

→ Leavenworthia torulosa Gray | Glade cress

Technical Description

Leaves--Early leaves with a long petiole and a broad, cordate blade; later fully grown leaves lyrate pinnatifid (as in the other species).

Flowers--Sepals narrowly oblong, 3.5-5.5 mm. long, greenish or with tints of lavender or maroon, spreading or erect at flowering time. Petals spatulate, 6-10 mm. long, emarginate, white or light lavender bladed usually, rarely yellow or deep lavender.

Fruit--Siliques linear, torulose (constricted between seeds so as to resemble a string of beads), 1.5-3.0 cm. long, 2.5-4.0 mm. wide, 2.0-3.5 mm. thick, styles 2.5-5.0 mm. long; gynophore (stalk below ovary and fruit) about 1 mm. long. Seed nearly wingless, longer than broad.

Distribution and Flowering Season

Locally abundant in limestone glades and calcareous soil of low fields and ditches, southern Kentucky through middle Tennessee, with one outlier in Bradley county in Southeastern Tennessee.

Special Identifying Features

This species is distinguished from all others by its torulose ovary and fruit. It is found in but one locality in Kentucky, but is often the most abundant species in many of the glades of middle Tennessee.

Leavenworthia torulosa Gray



245
BRASSICACEAE

100
↳ Lesquerella densipila Rollins, Duck River bladderpod
[1-2]

Technical Description

Taprooted annual from winter rosettes.

Stems.--Usually numerous, slender but stiffish, mostly 1-3 dm long, arching outward and upward in all directions from the root, terete, leafy from base to inflorescence, pilose with long weak hairs, pale green.

Leaves.--Rosette leaves 4-10 cm long, oblanceolate, lyrate or runcinate-pinnatifid (like dandelion). Stem leaves with lowest longest, elliptic, oblong, ovate, or obovate, mostly 3 cm long or less, ascending, acute to obtuse, the margin entire to distantly and coarsely low-toothed, the base auriculate-clasping, the surfaces pale green, pilose-hirsute, particularly toward the margins and along the midrib beneath.

Inflorescence.--An elongating raceme, the slender flower stalks ascending, longer than the open flower, compact at the flowering level, becoming more distant as the fruit ripens and the raceme axis elongates. Pedicels pilose, becoming 1-2 cm long in fruit.

Flowers.--Sepals, ovate or oblong, 3-4 mm long, somewhat calyculate (boat-shaped) acute or narrowly rounded, entire with narrow pale margins, erect or slightly spreading in bloom, the backs yellowish-green, pilosulous (with small, weak pale hairs). Petals 4, broadly obovate, 6-8 mm long, bright yellow, the bases cuneate, clawless. Stamens 6, 2 shorter; anthers erect, ca. 1 mm long, yellowish, oblong; filaments abruptly flattened and dilated basally.

Fruit.--Silicles globose or broader than long, 3-5 mm long, the surfaces covered with very fine, short hairs; style with some hairs; septum complete, not perforate. Seeds 2-4 locule, flattened and margined, 2.0-2.5 mm long.

Distribution and Flowering Season

Open alluvial sites, roadbanks, fields, or thin soil over limestone glades, middle Tennessee southward into northern Alabama. Flowering from February to late April.

Special Identifying Features

Of the auriculate-leaved species of Lesquerella known from the Southeast, this species is distinguished by a combination of yellow petals, and a globose fruit, the surface of which is copiously, minutely hairy.

Habitats and Management Implication

The habitats of this species vary rather widely from open limestone glades where it may be found with some species of Leavenworthia to very disturbed lowland situations where the substrate is a sticky, clayey circumneutral alluvium. These are plants of full sunlight and are today found in lowlands where the timber has been cut to provide fields or pasture. They are of optimum abundance in recently abandoned croplands in river or stream bottoms and should be considered part of early stages in secondary succession toward bottomland hardwoods or, in the case of glade populations to Juniperus, ultimately to mixed upland hardwoods. Thus, cutting of bottomland hardwoods or upland hardwoods in areas contiguous to populations of this and other Lesquerella species would probably increase the population of L. densipilla. They are definitely decreased by intensive row crop agriculture if sustained, or by the improvement of lowland pasture with grass species which would close the community.

Suggested Reading

- Rollins, R. C. 1955. The auriculate-leaved species of Lesquerella (Cruciferae.) Rhodora 57: 241-264.
- _____ and E. A. Shaw 1973. The genus Lesquerella (Cruciferae) in North America. pp. 1-288. Cambridge, Mass.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 555-556.

Revised March 1980

SPECIES: #1 Lesquerella densipila Rollins. Duck River bladderpod

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy							X	
Damage								X
No lasting effect	NA	NA	NA	NA				
Beneficial if done properly					X	X		

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Leavenworthia densipila Rollins



BRASSICACEAE

Lesquerella globosa (Desv.) Wats. ^[1-4] Globose bladderpod;
~~bladder-pod~~

Technical Description

Perennial or annual herb from a very stout taproot or a woody caudex.
Stems.--Usually numerous, giving plant a bushy appearance, arching shortly outward in all directions from the plant base, becoming erect, to 5 dm. long, terete, grayish because of a rather dense covering of simple and stellate hairs, the simple hairs attached at mid-point.
Leaves.--Numerous, mostly crowded along the stem from base to inflorescence, the lowest sometimes withered by flowering time, these usually longest and long-petiolate, with oblong, oblanceolate or elliptic blades 3-4 cm. long, the apices broadly acute or bluntish, the margins entire, undulate, distantly dentate, (rarely nearly pinnatifid) often emarginate, the bases cuneate or attenuate to petioles up to $\frac{1}{2}$ as long as the blade, the surfaces gray-green because of a liberal coating of appressed-stellate-hairs. Leaves becoming gradually narrower and more sessile, shorter up to the stem to the inflorescence.

Inflorescence.--Of several to very many regular flowers on mostly spreading slender pedicels longer than themselves, forming a more or less elongate raceme.

Flowers.--Sepals 4, elliptic to obovate, 2.5-4.0 mm. long, the laterals with sac-like bases, mostly nearly erect in flower, the backs finely stellate-hairy, pale yellow-green. Petals 4, obovate, 3.5-7.5 mm. long, spreading-bladed, margins sinuate, the surfaces a bright yellow. Anthers linear, erect on 6 filaments, 2 usually shorter, the filament bases flattened and dilated. Ovary globose or nearly so, its surface densely stellate-hairy, the style much longer, fully 2 mm. long.

Fruit.--Globose, about 2.0-2.5 mm. long with a scattering of stellate hairs, the margins of the 2 valves somewhat raised along contact; partition of fruit thin but continuous; style persistent. Seeds 2/locule of fruit, dimorphic, from oblong to nearly round, 1 side or the other often more convex, wingless, 1.0-2.5 mm. long.

Distribution and Flowering Season

River bluffs, talus of lower bluff slopes or calcareous soils of clearings, middle Tennessee north through north central Kentucky into Posey County, Indiana. Flowering from March through May.

Special Identifying Features

This species is to be distinguished from other southeastern area *Lesquerella* by its often perennial habit, its greater stature, its small rounded siliques which have stellate hairs and its widely spreading flower and fruit stalks.

Habitats and Management Implications

The habitats of the species are varied but it is most common either in full sun or in light shade on the limestone ledges along major streams such as the Cumberland. Here it may form locally heavy patches as well as the jumble of talus at bluff bases. It has also been found in pastures amongst scattered Juniperus. Wherever it is found in shade, some of the shade is contributed by Juniper, along with such species as oaks (mainly Q. shumardii, Q. muhlenbergii, Q. imbricaria, Q. alba), hickories, and ash, particularly the Blue and White. It may be amongst a scattering of shrubs such as Rhus aromatica, Forestiera ligustrina, Rhamnus. Its soils are always over limestone, are usually thin, heavy, often quite dry. In most cases the sites this plant frequents are steep, very poor for timber and, where desirable oak or juniper is present, would probably be cut selectively if at all. However, removal of the overstory to expose the limestone bluffs and outcrops would probably not promote increase of the species.

References

- Rollins, R.C. 1955. The auriculate-leaved species of Lesquerella (Cruciferae). Rhodora 57:241-264.
- _____ and E.A. Shaw. 1973. The genus Lesquerella (Cruciferae) in North America. pp. 1-288. Cambridge, Mass.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 555-556. Chapel Hill, N.C.

SPECIES: #42 Lesquerella globosa (Desv.) Wats. Bladderpods

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy						X		
Damage								X
No Lasting Effect	NA						NA	
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Lesquerella globosa (Desv.) Wats.



245
BRASSICACEAE;

→ Lesquerella lescurii (Gray) Wats. Nashville bladderpod;
Bladderpods [E-4].

Alyssum lescurii (Gray) Gray

Technical Description

This herb is similar in most ways to L. densipila (which see) but mostly somewhat lower, rarely with stems longer than 2 dm., and stem leaves with margins more consistently low-toothed. Significantly differing in the fruit, which is orbicular or slightly elliptical, 4-7 mm. long, definitely compressed, the valve surfaces covered with a mixture of pustular-based long trichomes and shorter branched hairs; septum of fruit complete. Seeds 2-4/locule, 2-3 mm. long, flattened and margined.

Distribution and Flowering Season

Open riverbottom fields and pastures, roadbanks, clearings and lots, in full sun and on alluvial clay, occasionally on thin soils over limestone outcrops, through most of middle Tennessee and particularly along the major drainages southward into northern Alabama (Limestone County). Flowering from March through April.

Habitat and Management Implication

This species is probably the most abundant in Davidson and Cheatham Counties of middle Tennessee where it is sometimes an aspect dominant in patchy lawns, in empty lots, or in riverbottom fields. It is definitely a lower successional level species, giving way to perennial forbs, ultimately to hardwood forest. It is known to hybridize both with L. densipila and the very local, white flowered L. stonensis. Much of the area in which it frequently abounded has gone over to housing, such developments being its major threat. It is maintained through that sort of natural or artificial disturbance that would keep an area of calcareous low soils open, relatively free of perennial forbs or forest.

References

- Rollins, R.C. 1955. The auriculate-leaved species of Lesquerella (Cruciferae) Rhodora 57:241-264.
- _____ and A.E. Shaw. 1973. The genus Lesquerella (Crudiferae) in North America. pp. 1-288. Cambridge, Mass.
- Small, J.K. 1933. Manual of the southeastenn flora, pp. 555-556. Chapel Hill, N.C.

SPECIES: #43 Lesquerella lescurii (Gray) Wats. Bladderpods

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect	NA							X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Lesquerella lescurii (Gray) Wats.



245

BRASSICACEAE

Lesquerella lyrata Rollins, Lyrate bladderpod

[1-1]

Technical Description

This herbaceous species resembles L. densipila vegetatively, in type and amount of hairs, in flower size and color, in pedicel and fruit shape. In fact it differs from the latter only in its slightly smaller (2.5-3.0 mm. long) fruit which are, together with the persistent styles, perfectly smooth.

Distribution and Flowering Season

L. lyrata is known only from cedar glade areas in the eastern part of Franklin County in northwestern Alabama. It blooms from late February into late April. Rollins (op. cit.) considers it a morphological-evolutional link between L. densipila of northern Alabama and middle Tennessee and L. auriculata, a species of Oklahoma and eastern Texas.

Land management implications for this species are the same as those for L. densipila and all other Lesquerella of the southeastern area save L. globosa.

Revised March 1980

SPECIES: #44 Lesquerella lyrata Rollins. Lyrate bladderpod

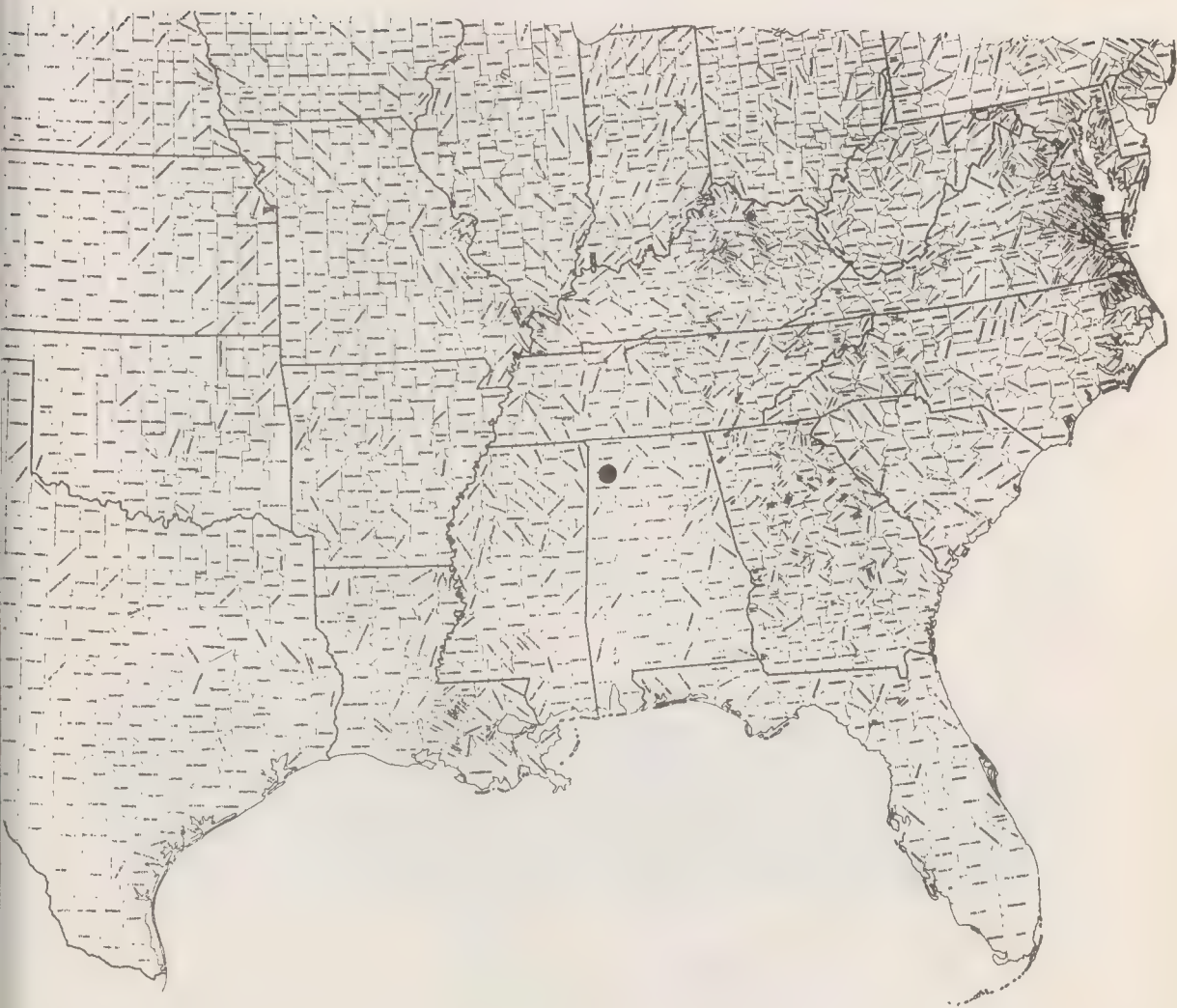
Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								X
No Lasting Effect	NA							
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Lesquerella lyrata Rollins



245
BRASSICACEAE

→ Lesquerella perforata Rollins, Spring-Creek bladderpod
[4]

Technical Description

Similar in habit to other annual auriculate Lesquerella.

Leaves: Rosette leaves similar, lyrate or runcinate pinnatifid, often absent by height of flowering. Stem leaves oblong to obovate, usually with margins sparingly to copiously dentate.

Flowers: Petals obovate or broadly spatulate, short clawed, 7-10 mm. long, white or pale lavender-bladed, the claw and blade base yellow.

Fruit: Fruit broadly obovoid to obpyriform, very inflated, 4-7 mm. long, the valves smooth to sparingly pilose on the outside, hairy on the inside; septum perforate, nearly absent. Seeds 2-6/locule, 1.5-2.5 mm. long, nearly round, strongly flattened and margined.

Distribution and Flowering Season

Limestone glades, limerocky pastures, in full sunlight, around Lebanon in Wilson County, middle Tennessee. Flowering from March through April.

Special Identifying Features

No other species of Lesquerella in the southeast combines this particular petal color with an incomplete septum; only L. stonensis resembles it in flower color.

Habitat and Management Implication

This species, which may be very abundant locally, is with its showy racemes of fragrant, white to pale lavender-petaled flowers not only striking but surprisingly limited in distribution with no populations known from outside a radius of 6 miles around Lebanon. It is usually found in well-drained clay loam pockets in rocky clearings and is, like the other auriculate-leaved species, a lower successional level plant that has maintained itself in disturbed situations. Improvement of the pastures it frequents would probably crowd it out, as will the shade influence of woody successional stages.

References

See references for L. densipila.

Revised March 1980

SPECIES: #45 Lesquerella perforata Rollins. Spring Creek bladderpod

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								
No Lasting Effect	NA							X
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Lesquerella perforata Rollins



245
BRASSICACEAE !

→ Lesquerella stonensis Rollins, Stones River bladderpod
[1-4]

Technical Description

Similar to L. perforata Rollins, differing mainly and significantly in fruit character. The fruit, in shape and character of papery valves not unlike L. perforata, measures 3-4 mm. long by 4-5 mm. wide, is sometimes somewhat bilobed; the valve surfaces are externally densely hairy, internally smooth. The style is hairy, at least toward its base. The septum is complete or somewhat perforated.

Distribution and Flowering Season

This showy species whose flowers, like those of L. perforata, are whitish and fragrant, is thus far known only from the open areas of floodplain of the Stones River near Walterhill. There, particularly in open fields and bottoms, it is locally abundant some years, virtually absent others. It blooms from March through April.

Habitats and Management Implication

It is disturbance-dependent, seeming to maintain its populations in alluvial situations that have recent exposures of heavy alluvium either through cultivation and abandonment or through flood deposition. Development of shrub or forest stages undoubtedly shades it out.

A small park and racetrack by the Stones River, together with a large grassy field comprise most of its area south of the river course. A large cultivated field just north of the river comprises most of its remaining known area. Hybrids between this and L. densipila (L. x maxima) have been discovered shortly downstream.

References

- Rollins, R. C. 1955. The auriculate-leaved species of Lesquerella (Cruciferae.) *Rhodora* 57: 241-264.
- _____ and A. E. Shaw 1973. The genus Lesquerella (Cruciferae) in North America. pp. 1-288. Cambridge, Mass.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 555-556.

Revised March 1980

#46 *Lesquerella stonensis* Rollins.
 SPECIES: Stones River bladderpod

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
<u>Destroy</u>							X	
<u>Damage</u>								X
<u>No Lasting Effect</u>	NA							
<u>Beneficial if Done Properly</u>					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Lesquerella stonensis Rollins



BRASSICACEAE

Streptanthus squamiformis Goodman [E-2] Prairie twistflower

Technical Description

Taprooted annual herbs from winter rosettes.

Stems.--Erect, (0.1-) 0.5-1.0 (-3.0) meters tall, terete, smooth, pale green and slightly glaucous, toward base often purplish or reddish tinged, usually simple, sometimes sparingly ascending-branched.

Leaves.--Rosette leaves lyrate-pinnatifid, oblanceolate, to 2 dm long, long-petiolate; cauline leaves toward stem base similar in size and outline to those of rosette, but progressively shortening upward on stem, becoming auriculate-clasping, lanceolate, acute, entire; leaf surfaces smooth, pale green or tinged with red or maroon or purple.

Inflorescence.--An elongating (indeterminate), bractless raceme resembling that of Larkspur, in full flower erect, cylindrical, the pedicels in bud short, approximate, in full flower erect or strongly ascending, to ca. 1 cm, stiffish, though slender, hirsute with flattish, white trichomes, in fruit over 1 cm long and rather distant on the elongated raceme axis.

Flowers.--Perfect, regular, showy; calyx at anthesis cylindric-campanulate, fully 1 cm long, the 4 distinct sepals lance-oblong, strongly tinged with rose or purple, their narrowed tips spreading-recurved even in the bud, their backs rounded, strongly hirsute with flattened, white hairs, their margins broadly white-scarious; petals 4, fully 2 cm long, long-clawed, the claw ca. 1 cm long, erect, the blade broadly obovate, spreading, abruptly narrowed to and attenuated on the claw, the distal margin erose, surface purplish or lavender rose toward blade center, paler marginally; stamens 6, 2 shorter, the filaments erect, 7-8 mm long, pale yellow, the anthers lance-linear, ca. 3-4 mm long, deeply sagittate, purplish-blue, erect and basifixed, the apiculate tips excurved; ovary at anthesis superior, purplish, linear, shorter than the stamens.

Fruit.--Silicles ascending, mostly 8-15 cm long, linear, to 3 mm broad, flattened with the septum perpendicular to the plane of the valves; seeds up to 60, oblong, 3.0-3.3 mm long, narrowly winged.

Distribution and Flowering Season

Dry to moist uplands or ravine slopes in dense to open woodlands or in clearings, Ouachita Mountains of southeastern Oklahoma and southwestern Arkansas; flowering from late April through May.

Special Identifying Features

Streptanthus squamiformis is at once distinguished from other species of its geographical area by the copious pubescence of its pedicels and sepal backs, these hairs prominent, whitish, spreading and flattened (hence "squamiform"). The densely hirsute buds are broadly ovoid, with sepal tips prominently excurvate, this feature very noticeable in the field.

Habitat and Management Implications

This Streptanthus actually occurs in a wider variety of habitat than its describer indicated. It is abundant in open, sloping to quite steep, mesic though rocky, woodlands, there growing under a mixture of oaks, elms, maples and Juniperus, and associated with such spring woodland herbs as Hepatica, Dentaria, sessile Trillium, Sanguinaria, Senecio obovatus, Thaspium, Zizia, various violets including V. pennsylvanica, Dodecatheon, several carices including the endangered Carex latebracteata Waterfall, the local Valerianella palmeri, grasses such as Bromus purgans, Poa sylvestris, Festuca versuta, many Panicum. In such sites it may be rooted in deep, moist, well drained sandy loams or clay loams. It may also be found in open stands of upland oak-hickory-shortleaf pine, where the understory is primarily Cornus and Vaccinium, the herbaceous associates quite different, with more Phacelia, Phlox pilosa, Monarda russelliana, Silene virginica, Krigia, Oenothera, Valerianella longiflora, V. nuttallii, V. radiata, Antennaria, Tradescantia, Coreopsis, and various upland grasses and carices. Here the soil may be shallow or deep, a sandy loam or clay loam, frequently droughty. Still another sort of habitat may be completely open, often cliffs or ledges, outcrops of shale, novaculite or even calcareous rock, the plants rooted either in cracks or depressions in the more massive rock or directly in shaley talus or broken rock. Large plants are often found along new roads or in powerline clearings where there has been recent mechanical disturbance of the soil; similarly they often show up in areas that have been clearcut and site prepared either by burning or mechanical treatment or a combination of these. In nature the plants probably maintained either in outcrop areas or open barrens and probably (just as they do today!) acted as pioneers in areas where fire and/or slope erosion had occurred. One may visit sites in various stages of succession after fire and mechanical disturbance, and see how this Streptanthus is reduced in vigor and numbers over time. The species is definitely weedy, persisting in mesic sites where the steepness of the site allows erosional forces to create openings of mineral earth, persisting in open upland sites or in areas of talus, cliff or outcrop, invading freshly disturbed contiguous area.

Thus, clearcutting, burning, or mechanical site preparation pose no real threat providing contiguous area of seeding plants is available. The plants will not persist in pine plantations.

References

- Goodman, G. J. 1956. A new species of Streptanthus. Rhodora 58: 354-355.

SPECIES Streptanthus squamiformis Goodman. Goodman's twistflower

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage No Lasting Effect								X
Beneficial if Done Properly	X	X	X	X	X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Streptanthus squamiformis Goodman



Paper 47
Text & Map by:
Robert Kral

245
BRASSICACEAE

100
V-4.
Warea amplexifolia (Nutt.) Small ~~clasp~~ ~~warea~~

W. auriculata Shinnars

Technical Description

Smooth, taprooted annual.

Stems.--Mostly 3-10 dm. long, erect, terete, the lower part brownish with shallow cracks, upwardly becoming greenish, shallowly grooved, branching from the middle, the branches spreading, then arching upward, or unbranched.

Leaves.--Alternate, the lowest absent by flowering time, the largest lowest, all rather closely spaced, ovate or elliptic, mostly 2-3 cm. long (progressively smaller and more distant upward on the stem and branches), acute, entire, the bases deeply auriculate-clasping.

Inflorescence.--Racemes rather short and broad, terminal to main stem and branches, the flowers symmetrical, close-set, spreading on slender stalks 1.0-1.5 cm. long.

Flowers.--Sepals 4, linear-spatulate, 5-6 mm. long, erect in bud, later reflexed, greenish with lavender tints. Petals 4, 8-10 mm. long, spreading-ascending, lavender-rose, the broadly obovate blades 3.0-3.5 mm. long on slender claws with papillate bases. Stamens 6, erect or ascending, the slender lavender filament projecting the linear, curved anthers well beyond the petals. Ovary erect, linear, on a stalk fully half as the filaments.

Fruit.--Linear, on spreading stalks, usually curved, 3-5 cm, long, laterally flattened.

Distribution and Flowering Season

Sand ridges, sandy open-pine scrub, central peninsular Florida; flowering from mid-summer through September.

Special Identifying Features

This species is nearest W. sessifolia Nash (which see), but the leaves are deeply auriculate-clasping (rather than just sessile) and the petal claws are not as roughened basally. The two do not overlap at all in range.

Habitats and Management Implication

This, like all Warea, is a plant of nearly pure sands, is locally abundant in both turkey oak-Longleaf pine and sand pine-evergreen scrub oak types, particularly where growth is open, or where it has been disturbed in the creation of roads or fields. Fire has doubtless long been the most important factor in creating or maintaining the openings Warea amplexifolia occupies. Logging and brushing increases it, and it will move into lands cleared and prepared for pine, persisting there in abundance until the crowns close.

References

- Channell, R.B. and C.W. James. 1964. Nomenclatural and taxonomic corrections in Warea (Cruciferae). *Rhodora* 46 (765):18-26.
- Shinners, L.H. 1962. Warea auriculata instead of W. amplexifolia of Small (Cruciferae). *Sida* 1:105-106.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 573-574. Chapel Hill, N.C.

SPECIES: #47 Warea amplexifolia (Nutt.) Nutt.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage								?
No Lasting Effect		?	NA					
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Warea amplexifolia (Nutt.) Nutt.



245 BRASSICACEAE

Warea carteri Small, Carter's warea

Technical Description

Taprooted, glabrous, slender annuals mostly 2-10 dm high.

Stems.--Erect, terete, deep green tinted with red proximally, becoming pale green distally, simple or (more commonly) ascending-branched from mid-stem up to form an open, roundish crown.

Leaves.--Alternate, estipulate, simple, those of the lower stem absent by anthesis, the largest at flowering time lowermost on stem and branches, on slender, spreading petioles to 1 cm long, the blades mostly 2-5 cm long, narrowly elliptical to oblanceolate or spatulate, rounded, entire, the bases cuneate or attenuate, the surfaces pale yellow-green, inconspicuously reticulate, only the midrib prominent, the foliage gradually diminishing in size upward on stem, grading to scattered, lineal bracts.

Inflorescence.--An indeterminate, tiny-bracteate raceme, the flowers numerous, the spreading, filiform pedicels 5-10 mm long (lengthening somewhat in fruit), subtended by triangular, scalelike bracts ca. 1 mm long, the raceme outline broadly short ovoid-oblong to nearly round.

Flowers.--Perfect, somewhat zygomorphic; buds obovoid-pyriform, the sepals valvate; sepals 4, distinct, unequal, linear-oblanceolate or narrowly spatulate, 3-5 mm long, apically recurved, greenish-white; petals 4, spreading, distinct and distinctly unequal, the longest 8-9 mm long with more than half the length a slender, strongly tuberculate-papillose-based claw, the blade suborbicular, spatulate to obovate or reniform, erose-margined, white; stamens 6, erect to spreading, somewhat unequal, distinct, hypogynous, the slender white filaments to 6 mm long, the anthers basifixed, narrowly oblong, ca. 2 mm long, pale yellow; ovary superior, lineal, subterete, ca. 2 mm long, raised on a slender gynophore to 2 mm long, the strongly bilobed stigma sessile or nearly so.

Fruit.--Siliques on spreading pedicels to 1.5 cm long, continuous with straight slender gynophores 5-6 mm long, the fruit body lineal, spreading-recurved, 4-6 cm long, ca. 1 mm wide, slightly compressed laterally, the septum compressed parallel to the valves; seeds numerous, oblong, smooth, ca. 0.6 mm long.

Distribution and Flowering Season

Sandy clearings in sandscrub and sandhills, southern peninsular Florida; flowering all year, but particularly from late September through October.

Special Identifying Features

Warea carteri is one of four species endemic to the southeastern area. It is most similar to W. cuneifolia, differing in the stronger pubescence of its petal claws and in the consistently white corolla. It is also geographically distinct, being confined to southern Florida, while W. cuneifolia ranges from northern Florida northward in sandhills to the Carolinas. The only species with which W. carteri might be sympatric is W. amplexifolia (Nutt.) Nutt., a consistently ovate-amplexicaul-leaved species of sandhills; flowers of the latter are pinkish or lavender.

Habitat and Management Implications

W. carteri frequents both yellow and white sand scrub sites, where pine is scattered in the overstory and made up of Pinus clausa, P. palustris or P. elliotii and where a variety of oaks such as Quercus laevis, Q. incana, Q. geminata, Q. myrtifolia, Q. chapmanii, etc., Carya floridana, Bumelia tenax, Asimina obovata, Chionanthus, Lyonia ferruginea, Ilex ambigua, etc., make up the scrubby understory. The saw palmetto, Serenoa repens is frequent to common. The sandy substratum is moist to quite dry, varying in color from yellow to nearly white, depending on the clay content. The Warea is normally found where the scrub is of low density or where, through a combination of fire and wind action, open patches of sand have developed. It may be associated with Selaginella arenicola, Pteridium, Opuntia, various Galactia, Paronychia hernarioides, P. chartacea, Lupinus cumulicola, Clitoria, several Euphorbia, Eryngium, Berlandiera subacaulis, many species of Aristida, Andropogon, Dichanthelium panicum, Bulbostylis warei, B. ciliatifolia, in other words species that are typical of sandy scrubland clearings or high pineland. As is true of most other annual herbs that inhabit this system, this is a plant of full sun or light shade, it is a poor competitor, and was probably maintained by woods fires that kept scrub vegetation reduced or by creation of small blowouts and sandy exposures through wind action.

The greatest threat to this particular species is urban expansion, with much of its former area now converted to residential lots, together with a replacement of scrub habitat by orange groves.

References

- Channell, R. B. & C. W. James 1964. Nomenclatural and taxonomic corrections in Warea (Cruciferae). Rhodora 66 (765): 18-26.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 573-574. Chapel Hill, N.C.

SPECIES Warea carteri Small. Carter's warea

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage No Lasting Effect								X
Beneficial if Done Properly	X	X	X	X	X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Warea carteri Small



245
BRASSICACEAE

Warea sessilifolia Nash Sessile-leaved warea

[1-2]

Technical Description

Smooth annual from a taproot.

Stems.--Mostly 3-10 dm long, erect, terete, slightly longitudinally grooved, slender, but rather stiff, upwardly green, toward base often purplish or maroon, unbranched or ascending-branched from near base or middle upward.

Leaves.--Alternate, close to distant along stems, the lowermost gone by flowering time, the lowest largest, ovate or oblong, mostly 1-3 cm long, ascending, acute, entire, the bases rounded, sessile, dark green or pale yellowish-green.

Inflorescence.--A rather short terminal raceme, this expanding slightly in fruit, the flowers symmetrical, showy in mass, on spreading slender stalks about 1 cm long.

Flowers.--Sepals 4, linear-spatulate, 5-6 mm long, green with reddish or purplish tints, at first erect, becoming reflexed. Petals 4, about 1 cm long, spatulate, with broadly obovate, retuse or emarginate blades and long, slender, minutely scabrid-based claws, bright or pale lavender or lavender-rose. Stamens 6, the slender lavender filaments projecting the linear, often coiled or excurved yellowish anthers beyond the petal tips. Ovary linear, erect on a slender stipe about as long as the petals.

Fruit.--On mostly spreading stalks at least 1 cm long, at tips of stipes at least as long as the stalks, linear, straight or somewhat curved downward, mostly 4-6 cm long, 1-2 mm broad, laterally flattened. Seed flattened, nearly round, about 1 mm long, notched at base, reddish-brown, smooth.

Distribution and Flowering Season

Dry, sandy, open woods, sandhills in the Coastal Plain, northwestern Florida and southeastern Alabama. Flowering mostly in August through October.

Special Identifying Features

This species is closest to W. amplexifolia (Nutt.) Nutt., a plant of similar habitats in eastern peninsular Florida. However, the latter species has definitely clasping-auriculate leaf blades.

Habitats and Management Implication

W. sessilifolia is most common in open sandhill forests populated by stands of longleaf pine-deciduous scrub oak, is particularly abundant in clearings or along the disturbed edges. It may also abound in sandy clearings of the sand pine-evergreen scrub oak type. In both sorts of forests it will quickly occupy areas from which the original woods have been cleared and prepared for planted pine; thus, it behaves as a weed. As the planted or seeded stand develops and as crowns close, it quickly disappears. In that woods fires reduce overstory, fire

tends to increase the species. Grazing reduces it, probably through trampling.

Suggested Reading

Channell, R. B. and C. W. James. 1964. Nomenclatural and taxonomic corrections in Warea (Cruciferae). Rhodora 66(765):18-26.

Shinners, L. H. 1962. Warea auriculata instead of W. amplexifolia of Small (Cruciferae). Sida 1:105-106.

Small, J. K. 1933. Manual of the southeastern flora, pp. 573-574.

Revised March 1980

SPECIES: #48 Warea sessilifolia Nash. Sessile-leaved warea

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy							X	
Damage								
No lasting effect		?						
Beneficial if done properly	X				X	X		?

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Warea sessilifolia Nash



245
DROSERACEAE:

→ Dionaea muscipula Ellis, [1-5].
 Venus'-flytrap, Common venus'-flytrap

Technical Description

Perennial, smooth, forming rosettes mostly 1.0-1.5 dm across from shallowly set "bulbs" made up of fleshy scale leaves, this bulb with a shallow diffuse root system.

Leaves.--Rosette leaves to 15 cm long, spreading in all directions from the contracted stem, numerous and spirally close-set; petioles green, mostly spatulate, flattened, with broad clasping bases, abruptly narrowed above these, then broadening apically and with a short, very narrow constriction just below the blade; blades round when spread, or broader than long (thus reniform), 2-3 cm broad, the midrib acting as a hinge, the edges stiffly long-ciliate, the surfaces green or strongly reddish or maroon tinted particularly on the upper surface, which has a scattering of erect, very slender hairs (tactile hairs).

Inflorescence.--Flowers regular produced few or several in umbel-like corymbs at summits of slender erect scapes to 3 dm long, the flower stalks elongating up to 2 cm subtended by elliptical, narrowly ovate or lanceolate bracts.

Flowers.--Sepals 5, lance-ovate, 5-10 mm long, greenish, with a scattering of minute simple or stellate, somewhat glandular hairs on backs and margins. Petals 5, distinct, cuneate-spatulate, spreading 10-4 mm long, the tips rounded-emarginate, the surface white strongly lined with green (somewhat like Grass of Parnassus); stamens between 10 and 20, usually around 15, distinct, spreading, the filaments slender, 5-7 mm long, the anthers 2-locular, nearly round; ovary superior, of 5 carpels, with 1 chamber, the style slender, tufted-branched at its tip.

Fruit.--Capsule ovoid, to 4 mm long, this irregularly splitting to reveal several black lustrous seeds.

Distribution and Flowering Season

Sphagnum bogs, shores, banks and seeps, Coastal Plain, eastern North Carolina south to northeastern South Carolina. Flowering May, June.

Special Identifying Features

This species, making up a genus, is unique. It is in the insectivorous family Droseraceae and like the related genus Drosera uncoils its expanding leaves as in ferns. Its leaf blades close, beartrap like, around insect "visitors" which produce a stimulus through contacting the slender tactile hairs on the upper leaf surface this communicated to motor cells along the hingelike midrib which

quickly collapse; thus the halves of the blade fold rapidly together, the stiff fringe of cilia interlacing along the closed margins, all this often entrapping the insect. Enzymes are secreted from glands in the leaf, these breaking down the proteins, which are then assimilated.

Habitats and Management Implications

The Venus' Flytrap is a true bog plant, is usually in the full sun of bogs populated by other insectivorous plants, particularly Drosera and Sarracenia, together with a wealth of bog grasses, sedges, orchids and liliaceous species. The bases (bulbs) are shallowly set either in sphagnum or on highly organic black sandy peat wash. The species will not reproduce on substrates other than permanently moist ones, is not very tolerant of shade. Neither does it tolerate much competition in the way of other herbs, particularly taller herbs, grasses or sedges. Best situations for it are sunny "washes" or exposures of moist to wet sandy peat where it and sundews may form small mats of growth. It is commonest in openings in pocosins or in pineland savanna, the pine overstory being mainly longleaf and/or pond pine, the shrub layer being mainly gallberry, Lyonia, Andromeda, Kalmia, Magnolia, Myrica etc. Historically, area was probably maintained for it by periodic burning of the flatwoods and pocosins, thus removal of excess shade and other competing herbs and shrubs. Today, it frequently occupies areas where clearcutting or heavy logging has taken place so long as there are contiguous seed sources; it may also abound where there has been considerable soil disturbance either through site preparation or through road construction. However, it will not persist where pine plantations produce heavy shade nor will it survive the drainage that often accompanies site preparation. Some of the best places to look for it are along the road systems where seepage develops along the road shoulders and ditchbanks, or where wet savanna has been recently burned.

This is one of the most exploited of southeastern plants, large populations being decimated or exterminated for the novelty plant trade. Thus the greatest threats to the species are exploitation, drainage for agriculture or pine plantation, and protection of wet habitat from fire.

References

- Radford, A. E. et al. 1968. Manual of the Vascular Flora of the Carolinas, p. 518. Chapel Hill, N.C.
- Small, J. K. 1933. Manual of the Southeastern Flora, p. 580. Chapel Hill, N.C.

SPECIES: #127 Dionaea muscipula Ellis, Venus'-flytrap

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X (eventually)	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X		X		X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Dionaea muscipula Ellis



245 SARRACENIACEAE

Sarracenia alabamensis Case & Case, Alabama cane-break pitcher-plant

Technical Description

Strongly tufted, rosulate, perennial insectivorous herb.

Leaves.-- Trimorphic, producing persistent phyllodia similar to those of S. oreophila (which see!), followed later by two sorts of pitcher leaves; vernal (earliest) pitcher leaves appearing with flowers, in size and color as well as shape comparable to those of S. rubra, 0.8-5.0 dm long, erect, greenish, softly pubescent, the hood cordate, suberect, 1.9-8.0 cm long, 1.7-6.0 cm broad, pale green, toward the apex of the pitcher and on the hood surface reddish-reticulate-veiny; late season leaves largest, some fully to 6 dm long, dilating gradually from the clasping base, somewhat alate (winged) ventrally, at orifice 3-7 cm broad, the orifice rim recurved, the hood blade ca. 4-10 cm long, 3.5-6.6 cm wide, reniform or cordiform, acutish, erect or slightly arching forward over the orifice, reddish-veiny, often toward apex of pitcher near orifice faintly whitish-areolate.

Flowers.-- Solitary at nodding tips of stiffly erect peduncles 3.5-5.7 dm high, frequently in vigorous plants two scapes (rather than one as in most forms of pitcher plant) being produced from a rhizome tip, each scape at its summit directly under flower producing an involucre of 3 bracts, these usually recurved, triangular, firm, 4.5-6.0 mm long; sepals ovate, 1.7-2.6 cm long, mostly ovate or lance ovate, to 2.2 cm broad, inwardly bent, reddish or greenish tinted with red or maroon; petals 5, distinct, panduriform, 3.5-4.5 cm long, externally blood red, inner surfaces largely pale green, the broadened base narrowed to a short claw attaching petal to receptacle, the blade above the constriction broadly obovate, hanging downward around the broadened style apex; stamens numerous, distinct, the anthers deep yellow; ovary superior, warty, 5-carpellate, nearly round, the style bearing an umbrella-like, peltate disc 3.5-4.2 cm broad, the 5 stigmas borne just below the bifid tips of the 5, recurved disc angles. Fruit and seed not seen.

Distribution and Flowering Time

Fall-line sandhills seeps, swamps and bogs, Autauga, Chilton and Elmore Counties, Alabama; flowering late April into early June.

Special Identifying Features

This plant is described by Case as different on the basis of its production of spreading-recurved, falcate phyllodia (like S. oreophila), reddish flowers as in S. rubra and with similar but sigmoidally curved early pitchers but differing from it in having larger, velvety-puberulent summer leaves. Hybrids between S. rubra and S. alata from Washington County, southwestern Alabama are enough like the Case description as to be placed in this, his new species. As Case and Case (1974) have indicated, S. rubra is extremely variable. McDaniel (1971) states that at least 3 geographical extremes of it exist, and accounted for the S. "alabamensis" populations as one of these. It would thus appear that

further investigation is required before the distinctness of S. alabamensis as a species is accepted.

Habitat and Management Implications

This pitcher plant grows in full sun or light shade, on highly saturated, boggy sphagnum soils, usually in association with various grasses, sedges, and orchids such as Pogonia, Calopogon, Cleistes, Xyris, Eriocaulon, Lachnocaulon, Polygala, Rhexia, etc. Usually it is in clearings amongst shrubs such as Myrica, Alnus, Rhus vernix, Vaccinium, Smilax and Arundinaria are abundant, often dominate this layer. Overstory when present is a mixture of Magnolia virginiana, Ainus taeda, Acer rubrum, Liquidambar, various willow oaks, Nyssa. Reports by Case the first discoverer of the populations, Dr. R. Harper (1921) indicate that the Sarracenia populations were usually in more or less open sites, the shrub competition little and scattered and Case (op. cit.) states that this condition prevailed in the 1950's when he first visited the localities. The same areas today have, presumably through protection from fire, become much more shrubby, to the disadvantage of the Sarracenia. Much of its former area is being invaded by Lonicera japonica which engulfs everything. Other area has been either cleared or drained, converted to pasture or other agriculture. Thus the known localities from S. alabamensis (or these S. rubra!) have become fewer. Adding to the difficulty is the fact that plant "poachers" have visited remaining populations frequently for purpose of getting plants to sell. Areas where this pitcher plant remains should be kept undrained, free from trampling from cattle, periodically moderately burned to release the plants from shrub competition and, if logged, this done selectively with minimal mechanical disturbance.

References

- Case, F.W. & R.B. Case, 1974. Sarracenia alabamensis, a newly recognized species from central Alabama. Rhodora 76 (808): 650-665.
- Harper, R.M. 1922. Some pine-barren bogs in Central Alabama, Torreyia 22: 57-59.
- McDaniel, S.T. 1966. A taxonomic revision of Sarracenia (Sarraceniaceae) Bull. Tall Timbers Res. Sta. 9: 1-36.
- Small, J.K. 1933. Manual of the Southeastern flora, pp. 580-583. Chapel Hill.

SPECIES Sarracenia alabamensis Case & Case. Alabama
cane-brake

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Drainage of site destroys this species!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sarracenia alabamensis Case & Case.



45
SARRACENIACEAE

Sarracenia oreophila (Kearney) Wherry ~~green-pitcher-plant~~
~~*S. flava* L. var. *oreophila* Kearney, nom. nud.~~

Technical Description

Perennial, insectivorous, rosette-forming herb from at stoutish, horizontal rhizome to 1.5 cm thick, this covered by a scaly, brown chaff of old clasping leaf bases plus triangular, acuminate scale leaves.

Leaves.-- Two sorts produced: phyllodial (non-pitcher) type mostly falciform (curved as in a scimitar or sickle), 4-15 cm long, mostly 1-2 cm broad, flattish, attenuated to an abruptly broadened, thin, clasping, pale or reddish base, spreading, more numerous than the tubular (insectivorous) leaves, persistent, developing before and after flowers; tubular type much longer than phyllodes, to 7.5 dm long, dilating gradually from base to rim which is 5-6 cm in diameter and with a narrow, recurved flange, the main veins parallel with the dorsal (midrib) and ventral (zone where margins have fused) ones somewhat raised into low wings; lid of larger pitchers 4-10 cm long, constricted and revolute at its base, widening to an ovate or reniform blade 5-10 cm broad which arches slightly forward above the constriction, is broadly acute or obtuse, sometimes apiculate, with sides broadly rounded at base, there revolute; pitcher body externally yellow-green, the major veins toward orifice often maroon, the lid also green but with principal veins and reticulate side veins particularly within, dark maroon.

Scapes.-- Usually solitary, 3-4 mm thick, green, stiffly erect, 4-7 dm high, terete, fistulose, crooked at tip, thus the flower nodding.

Flowers.-- Regular, bisexual, solitary at nodding scape tips, subtended by an involucre of 3, spreading or recurved, lanceolate or triangular-ovate, yellowish or whitish-green, thin-edged bracts ca. 1 cm long, the tips rounded; sepals 5, distinct, lance-ovate, 4-5 cm long, spreading, then arching downward, apically narrowed but rounded, the backs toward apex somewhat concave, yellow-green, toward the narrowed base reddish; petals 5, distinct, clear yellow, pandurate, ca. 5 cm long, 1/3 from base (attachment) hooked over the broad stigma rim, thus the elliptic to oblong or obovate blade pendulous, its apex rounded; stamens numerous, hypogynous, the filaments slender, smooth, the anthers oblong, versatile, ca. 4 mm long; ovary superior, 5-carpellate, warty, nearly round, abruptly constricted to a short linear style base, this abruptly expanded into a broad, convex, peltate, round (parasol-like), yellow-green style disc 4.0-5.5 cm broad, this radiately 5-nerved, each nerve reddish, terminating in a recurved, bifid-tipped lobe, the stigmatic area located just below the slit within.

Fruit.-- A tardily dehiscent, 5-lobed, nearly globose, warty capsule 1.5-2.0 cm broad; seeds numerous, ca. 2 mm long, irregularly obovoid, warty and foveate.

Distribution and Flowering Time

Bogs, Blue Ridge streambanks and seeps, northeastern Alabama, northeastern

Georgia and an old, doubtful record from coastal Plain Georgia (Taylor Co.); flowering late April into June.

Special Identifying Features

This species is distinguished from the other yellow-flowered pitcher plants by its falcate-recurved phyllodes. The other two species which look like it in pitcher leaf and flower are *S. flava* L. and *S. alata* (Wood) Wood, whose phyllodia (when present) are erect and gladiate. *S. oreophila* has a range apart from any other species save possibly *S. rubra* (*S. alabamensis*?) which is red-flowered, has more erect, sigmoidly bent phyllodes.

Habitat and Management Implications

S. oreophila is always on wet, sphagnum sites such as seepy depressions in oak or oak-pine barrens, hillside bogs, or stream and river banks. Its herbaceous associates are mostly grass-sedge, with an admixture of bog orchids, *Xyris*, *Eriocaulon*, *Lachnocaulon*, *Drosera*, *Schoenolirion*, *Polygala*, *Utricularia*, etc. Shrubs such as *Ilex verticillata*, *Viburnum cassinoides*, *Alnus*, high bush *Vaccinium*, *Itea*, etc. are often present, usually increasing and tending to crowd or shade out the pitcher plants and other forbs. In some localities the plants may also be in light shade of open stands predominantly of oak or of oak and pine. The species was once much more widespread in the Blue Ridge and Cumberland Plateau of northern Alabama but has been largely extirpated there due to conversion of boggy areas to crop or pasture land through drainage and plowing, or through creation of farm ponds from bog streams. Light use of areas as cattle pasture appears to have little adverse effect, the main damage appearing to be from trampling rather than browsing. The boggy clearings *S. oreophila* frequents are usually in various stages of occupation by both shrub and overstory species, so that populations may be observed in various stages of being crowded and shaded out. This is definitely a fire-successional herb (as are most of the other *Sarracenia*!) and probably was maintained over time by periodic moderate natural fires. Fortunately for *S. oreophila*, there are several small populations in the relatively inaccessible floor of the Little River canyon, much of which is state-owned.

References

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- Wherry, E. T. 1933. The Appalachian relative of *Sarracenia flava*. *Bartonia* 15: 7-8.

SPECIES Sarracenia oreophila (Kearney) Wherry. Green pitcher-plant

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage No Lasting Effect								X
Beneficial if Done Properly	X				X	X		

Other Comments: Site drainage destroys this species!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sarracenia oreophila (Kearney) Wherry



245
100
SARRACENIACEAE

Sarracenia psitticina Michx. parrot pitcher-plant

Technical Description

Rhizomatous, rosette-forming, smooth, scapose, perennial, insectivorous herb.
Stems.-- Short, usually ascending, densely covered by spirally arranged leaf bases, arising from stoutish, variously elongate, shallowly set rhizomes.
Leaves.-- Of two sorts, one scale-like (squamelloid), deltoid, acuminate, overlapping, on the rhizome, the other ascidiform (joined by the margins to form a "pitcher") mostly 8-15 (-20) cm long, making up the rosette, the bases clasping, overlapping, in a tight spiral, spreading-ascending, viewed from the side sigmoid with the apex incurved, the petiole gradually widening distally, on the ventral (upper, in) side flattening and dilating into a broad wing, this broadest in the upper 1/3 and narrowing more abruptly into the pitcher rim, the pitcher tube very narrowly funnelform, toward the apex purple-reticulate, the areolae pale, translucent, the pitcher hood saccate-ovoid, "bubble-like", acute, incurved over the pitcher orifice, its inflated back purple-reticulate, also with translucent, pale areoles.
Inflorescence.-- Flowers solitary, nodding at apex of terete, fistulose, scales mostly 15-30 cm long, perfect, regular; bracts 3, whorled, oblong-triangular, blunt, reddish-green or maroon, ca. 5-8 mm long, spreading or reflexed; sepals mostly 5, bluntly ovate-triangular, 2-3 cm long, spreading-incurved, the backs maroon, the upper surfaces paler, usually greener; petals mostly 5, 2.0-4.5 cm long, the short, pale claws hooked over the petalate stylar apex, the oblong-ovate, panduriform (like violin body) blades reddish-maroon, flat, pendulous; stamens numerous, the sigmoid or straight, slender pale filaments fascicled, of various lengths, the anthers dorsifixed, horseshoe-shaped ca. 2 mm long, 2-locular, extrorse, these and the filaments concealed by the umbrella-shaped, pale yellow-green stylar apex; ovary superior, 5-locular, the stigmas "teat-like" at and below the bifid apex of the angles of the style lobes.
Fruit.-- A subglobose, loculicidal capsule ca. 1 cm broad, moderately tuberculate; seeds bluntly obtriangular, 1.5-2.0 mm long.

Distribution and Flowering Time

Bogs and margins of acid flatwoods ponds and streams, clearings in cypress swamps, Coastal Plain, southeastern Georgia south to northeastern Florida and westward through the Gulf Coastal Plain into the Florida parishes of Louisiana; flowering from late March through May.

Special Identifying Features

This pitcherplant is the only one in the southeastern area to combine small size of pitcher with the odd "bubble-like" pitcher hood, broad pitcher wing, small purplish-maroon flowers (similar superficially to those of S. rubra), and an areolar pattern similar to that of S. leucophylla and S. minor. It hybridizes in nature with S. purpurea (S. catesbaei), with S. alata (ac-

according to Dr. S. McDaniel, whose treatment is consulted in preparation of this report).

Habitat and Management Implications

S. psittacina, as is true of the other Sarracenia, is a plant of boggy, high-hydroperiod, peaty or sphagnum sites such as are found in flatwoods depressions, seep slopes, acidic swamps, wet savannas, or bogs. It is usually in full sun or light shade, is part of a grass-sedge formation, tends to be crowded and shaded out by invading shrub or tree complexes, and tends to increase when this is reduced either by clear-cutting or fire. It is totally eliminated or drastically reduced by any form of mechanical site preparation, either in the first process, which usually also involves drainage ditching of the wetlands or later, when the planted or seeded pine closes over the grass-sedge formation and shades it out. This small, interesting species is also much abused by those who dig up the plants for sale. Management to maintain it and other pitcher plant species has to involve controlled burning to retard forest successional pressures, together with a light enough stocking of pine (preferably longleaf or slash) to insure that enough light reaches the plants, and an absolute adherence to a high soil moisture regimen.

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SPECIES Sarracenia psittacina Michx. Parrot pitcher-plant

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: Site drainage destroys this species!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sarracenia psittacina Michx.



CRASSULACEAE

Sedum nevii A. Gray, Nevius' stonecrop

[1-5]

Technical Description

Succulent, smooth, low perennial from slender, creeping stoloniferous rhizomes.

Stems. --Of two sorts, sterile and fertile, the sterile produced in summer and fall from the slender, creeping rhizomes, usually not longer than 5 cm., sprawling or decumbent; fertile shoots produced in spring, usually close-set from rhizome just beyond the sterile shoots, few-to-several, decumbent, terete, pale green, to 15 cm high.

Leaves. --Sessile, spreading, the bases short-decurrent, spirally arranged, the blades of sterile shoots smallest and most distant at shoot base, close-set (thus shoot tips very leafy) and largest distally on the shoot, the lowest mostly broadly spatulate, flattened, broadly obovate, the uppermost 5-8 mm long, broadly spatulate, pale green, sometimes slightly glaucous; leaves of fertile shoots shortest toward stem base, there mostly linear, oblong, or narrowly oblanceolate or spatulate, the largest at mid-stem or above, spreading, nearly terete to somewhat flattened, linear to narrowly linear-oblanceolate, mostly 1.0-1.5 cm long, deep gray-green.

Inflorescence. --Broadly cymose, the flowers numerous, sessile along the upper side of the 2-5 spreading-recurved branches, the lineal bracts slightly shorter or slightly longer than the flowers, scattered.

Flowers. --Regular, complete. Sepals 4-5, lanceolate to oblong, linear, or narrowly spatulate, often unequal, mostly 2.5-3.5 mm long, green, blunt-tipped. Petals 4-5, lance-attenuate, ca. 5 mm long, white. Stamens about as long as the petals, usually 10, the short-oblong, cinnamon-red anthers ca. 0.5 mm long, the linear filaments white, slightly dilated at base, attached at rim of a short hypanthium. Carpels lanceolate in outline, distinct, equal in number to petals, ca. 4 mm long, angulate, pale, tapering into the style to produce a definite beak.

Fruit. --Follicular, keeping much the same shape but slightly larger than the ovaries, straight but spreading at maturity.

Distribution and Flowering Season

Moist, shaded or sunny, usually calcareous or shaley rock of bluffs and ravines, usually forming mats intermixed with mosses, western North Carolina and eastern Tennessee (Polk Co.), southward into Appalachian Alabama. Flowering in May and June.

Special Identifying Features

S. nevii has been treated variously by authors, often being considered

the same as S. glaucophyllum Clausen, but having a different chromosome number and, in general, is an even smaller plant with less glaucous foliage, smaller, narrower offshoot leaves, smaller flowers. It has been confused sometimes with perennial races of S. pulchellum Michx. as well, but again is of lower stature, with flatter flowering shoot leaves and smaller, white flowers.

Habitats and Management Implications

S. nevi forms small to rather extensive mats or patches, usually mingling with various mosses on or around outcrops of limestones, dolomites or calcareous shales, and under mixed hardwoods of ravines and river bluffs. Overstory species consist of a mixture of Quercus alba, Q. muhlenbergii, Q. shumardii, Q. rubra, Q. velutina, Ulmus, Tilia, Acer saccharum, A. rubrum, Fraxinus americana, etc., with a scattering of Pinus, Juniperus (this being shaded out, or occurring in small clearings). Associated with the sedum in addition to mosses are such spring flowering herbs as Dentaria, Hepatica, Ranunculus, Claytonia, Viola, Dodecatheon, Vicia, Uvularia, etc., various carices, ferns such as Cystopteris, Woodsia, Asplenium, Pellaea, Cheilanthes, and a variety of grasses including Melica, Poa, Bromus (purgans), Panicum (particularly P. commutatum, P. dichotomum, P. laxiflorum), Chasmanthium, Muhlenbergia. In that the Sedum is on a thin soil mantle on or around outcrops and boulders, it is evident that heavy logging of the overstory would have an adverse effect either through admission of too much light, thus drying out the habitat, or through the erosion stimulated by the mechanics of timbering these steep areas.

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SPECIES: #50 Sedum nevii A. Gray. Nevius' stonecrop

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy	X							
Damage								
No lasting effect		NA	NA	NA	X			
Beneficial if done properly								

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Sedum nevi A. Gray



Paper 51

Text & map by:

Robert Kral

245
CRASSULACEAE

Sedum pusillum Michx. Granite rock stonecrop;
Puck's-orpine [1-5]

Technical Description

Annual smooth succulent herbs from flimsy, shallow, diffuse roots and winter rosettes.

Stems.--Shoots solitary or tufted, mostly 8 cm long or less spreading or erect, round in cross section, pale green, simple save in the inflorescence or sometimes with short, densely leafy lateral branches below, or much branched with numerous, upsweeping lateral branches.

Leaves.--Numerous, spirally arranged, the lowest gone by flowering time, all estipulate, all turgid (much thickened), 1 cm long, usually less, elliptic, spatulate, or obovate, greenish.

Flowers.--Symmetrical, about 5 mm broad in a simple cyme or a compound of cymes on slender but fleshy stalks 5 mm or less long. Sepals 4 (-5), forming a cup with the receptacle, the lobes broadly triangular, thinnish, entire, greenish, about 1 mm long. Petals 4 (-5), white with thin purplish lines or tints, oblong or ovate, 2.5-3.0 mm long, spreading in flower. Stamens 8 (-10), nearly as long as the petals, the anther very short, dark reddish-brown, the filaments lavender-pink-tinted, broadening and flattening toward their bases, spreading. Ovary superior, the carpels 4 (-5), in flower about 2 mm long, oblong, narrowing abruptly to short, slender, beaklike styles, erect in bloom, separate to near their bases, growing into spreading follicles up to 4 mm long.

Fruit.--Seeds numerous, broadly wedge-shaped, about 0.5 mm long, often greenish.

Distribution and Flowering Season

Granite outcrops, Piedmont and Blue Ridge, North Carolina southward and westward into Georgia. Flowering from March into May.

Special Identifying Features

Sedum pusillum is the smallest species of the genus in the southeast and differs from the others in its deltoid sepals. Superficially it is much more like Diamorpha, a small (2 species), closely related genus of the same outcrop areas, but Diamorpha has its carpel bases fused and its pinkish petals toward the apex tend to be somewhat pouched. The best way in the field to distinguish the two is by the color of foliage, that of Diamorpha forming patches strongly tinted with red or maroon, looking like patches of ships-rust on the granite, while leaves of the Sedum are green.

Habitats and Management Implication

This small species is usually found in full sun, becoming very abundant on the granite outcrops wherever there are shallow depressions large enough for water to pool and some thin substrate to wash in and accumulate. There it will be

found with other outcrop plants such as Lindernia monticola, Amphianthus pusillus, Diamorpha, Talinum etc. The granite outcrops range from small relatively low patches to considerable domes of hundreds of acres, and all are in the oak-hickory-yellow pine belt. The climax forest is mostly oak-hickory with pines occupying the thinnest mantles of soil first. As forest proceeds to occupy plants such as this one of the open granite are shaded out. Logging in such delicate systems as this is not recommended, nor is burning, but in either instance the result might well be to increase their area by reducing shade. The most significant threat to Sedum pusillum is through quarrying away of the granite, a process which has already eradicated the species over a part of its range.

References

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SPECIES: #51 Sedum pusillum Michx. Pucks-orpine

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy								
Damage								
No Lasting Effect	NA							X
Beneficial if Done Properly					X	X	NA	

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Sedum pusillum Michx.



Text and map by:

100 Robert L Kral

245
SAXIFRAGACEAE:

Heuchera arkansana Rydb. ^[1-3] Arkansas alumroot

H. villosa Michx. var. arkansana (Rydb.) E. B. Smith

Technical Description

Rosulate perennial herbs from elongated, stoutish surficial or shallow, creeping rhizomes with an exfoliating epidermis.

Leaves.--Numerous in the basal rosette, erect or spreading, highly variable in length, sometimes the "tufts" to 4 dm high, the petioles to 3 dm long; petioles slender, rigid but soft, terete, ribbed, pale green or tinged lightly with red, villous with most of the pale hairs gland-tipped, the petiole bases abruptly clasping; blades 1/2 or less as long as the petioles, soft, reniform to sub-orbicular, angulately low-lobed, the 5-7 broad lobes rather coarsely, somewhat unevenly dentate, the larger teeth tipped with a callused denticle, this bearing an elongate, gland-tipped trichome, the base shallowly to deeply cordate; upper leaf surface a dark dull green, villous-hirsute, the hairs gland-tipped, these hairs admixed with short-stipitate to sessile glands, the lower surface markedly paler, villous-hirsute-glandular.

Inflorescence.--Peduncles 1-several, from the axils of the leaves, erect or ascending, slightly shorter than to somewhat longer than the leaves, slender, with a few, distant, lance-linear, scarious-bordered, villous-ciliate, scaly bracts, the lowest ca. 1.0-1.5 cm long, the main axis terete and ribbed or slightly angulate, villous-glandular, with the glands shorter-stalked in the inflorescence; panicle cylindrical, ca. 7-15 cm long, the numerous, slender primary branches ascending or spreading, from axils of scale-like bracts, simple or forking once, the few-to-several pedicels short, stipitate-glandular, scaly-bracteolate, in short, indeterminate racemes or corymbs, the whole inflorescence densest distally, more open toward the narrow base.

Flowers.--Hypanthium with 5 calyx lobes forming a campanulate outline, from base to tip ca. 2 mm high, the whole surface stipitate-glandular; calyx lobes slightly unequal, erect, thus calyx apex slightly oblique, the lobes narrowly ovate to oblong, ca. 1.0-1.3 mm long, apically rounded, marginally stipitate-and-glandular-ciliate, pale green; petals 5, distinct, arising from hypanthial rim, linear-spatulate or linear oblanceolate, lingulate, ca. 2 mm long, apically excurvate, white; stamens 5, unequal, distinct, arising from hypanthial rim, erect, the filaments linear-terete, the longest to ca. 2.5 mm, the nearly orbicular, pale yellow anther sacs dorsifixed, divaricate, with lateral dehiscence; ovary bicarpellate, nearly superior, fused to hypanthium only at very base, the body ovoid, ca. 1.5 mm high at anthesis, tapering gradually into the stiffish, somewhat divergent, stout-linear styles, these each tipped by a short, papillate stigma.

Fruit.--Capsule broadly ellipsoidal, 2-valved, from base to tip of persistent style ca. 6-7 mm long, the body fused to hypanthium

ca. 1/3 its length; seeds pale brown, short-cylindrical, slightly curve, longitudinally with many muriculate lines, ca. 0.7 mm long.

Distribution and Flowering Season

Shaded ledges of calcareous or acidic rock, the Ozarks, north central to northwestern Arkansas; flowering from June to September.

Special Identifying Features

Recently Smith (1977) broke from tradition by making this another variety of H. villosa, a common and widespread plant of shaded or sunny cliffs and ledges through much of the eastern U.S. It is true that the Arkansas material differs in its somewhat shorter, broader-based flowers (these often appear "round"), its more compact inflorescence. It is usually a smaller version of H. villosa macrorhiza, a very robust plant locally abundant in calcareous bluffs along the Cumberland and Tennessee Rivers in Kentucky and middle Tennessee. When H. arkansana was first described it was considered an Ozarkian disjunction from H. villosa proper. Recent collections have closed the gap and even the variety is tenuous if a consistent taxonomy for Heuchera is sought.

Habitat and Management Implications

H. arkansana is confined to ledges of calcareous or sandy rock along the major stream and river systems. Usually these ledges are in the shade of mixed hardwoods, less often in full sun and, in the sunny sites, there is usually some seep water at least part of the year. Associated herbaceous plants are mostly ferns, a few carices, grasses such as Festuca, Bromus, and other saxifrages. Lianas are common over the rock, particularly Vitis, Parthenocissus, Ampelopsis, Rhus radicans, etc. The Heuchera is shallowly rooted in a shallow soil mantle, this often held together by various mosses and liverworts, all frequently breaking or slipping away from the rock during rainy spells, or washing away from the Heuchera rhizomes, leaving them largely exposed. In that such habitat is so sensitive, clear-cutting of the forest on the steep slopes and contiguous river and creek bottoms definitely would have an adverse effect on this rock plant. The greatest danger to the plants however has come from the excessive dam building within the range of the species, so that the lower reaches of many of the bluffs it used to frequent have been inundated by reservoirs.

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SPECIES Heuchera arkansana Rydb. Arkansas alumroot

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA		X	NA	
Damage					X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Heuchera arkansana Rydb.



945
SAXIFRAGACEAE

→ Ribes echinellum (Coville) Rehder Florida gooseberry
Grossularia echinella Coville [2]

Technical Description

Spreading, irregularly branched shrubs to 1.5 meters tall.

Shoots.-- Usually several from a knotty, shallow crown, the branches spreading, arching, often rooting at tips where these touch ground, the bark thin, pale gray-brown, on older wood broadly cracking longitudinally to reveal reddish-brown inner bark; new shoots slender, spreading, somewhat zig-zag, pale gray-brown, bearing 1-3 spreading nodal spines to 1.5 cm long, and decurrently ridged from the sides of the leaf scars the length of the internodes; shoot buds ovoid, ca. 4 mm long, the scales imbricate, thin, reddish-brown, ciliate.

Leaves.-- Alternate, close-set on abundant spur shoots or distant on elongated shoots, orbicular on slender, greenish, hirsute to pilose petioles 1-3 cm long, these with abruptly broadly clasping, elongate-glandular-ciliate bases; blades suborbicular, 1-3 cm wide, mostly palmately 3-5 parted, the sinuses mostly sharp, shallow to deep, the lobes cuneate to oblong, their tips dentately or crenately few-toothed, the margins ciliate, the upper surface dark green, smooth or pilose along the veins, the lower surface paler, appressed-hairy.

Flowers.-- Axillary to new shoot leaves, perfect, regular, on slender, spreading or ascending peduncles about as long as the subtending petiole and bearing a white tomentum of villous (crisped) hairs mixed with stiffish, spreading, gland-tipped hairs, bearing also just below the flower a pair of ovate-oblong, green, clasping-based, pilose bractlets: perianth tube narrowly campanulate, its base around the ovary with a dense coating of stiffish, glandular-capitate hairs (these later becoming spines on the fruit), above pilosulous, then spreading into 5 oblong or spatulate, puberulent, greenish, erect calyx lobes ca. 5 mm long which at anthesis become sharply reflexed; petals 5, erect, broadly oblong, 3.0-3.5 mm long, strongly inrolled, widest at the truncate apex, there erose, the bases arising from an hypanthial rim; stamens 5, alternating with the petals, erect, the slender, terete filaments lengthening to 0.8-1.5 cm, the base fixed, oblong, 2-locular anthers ca. 2 mm long, at first cinnamon-red, later purplish; ovary inferior, the style slightly shorter than the stamens, cleft to below the middle.

Fruit.-- A globose to ellipsoidal or ovoid, greenish berry 1.0-1.5 cm long, the surface beset with numerous, spreading, stiffish and gland-tipped prickles, these yellow-green, 3.0-3.5 mm long.

Distribution and Flowering Time

Sandy loams of mixed deciduous forest, Piedmont, South Carolina (McCormich Co.) and northern Florida (Jefferson Co.); flowering from late February into early April.

Special Identifying Features

This species differs from the only other bristly-fruited Ribes of the southeastern area, R. cynosbati, by its smoother leaves (in R. cynosbati the leaves are pilose above), its gland-tipped or capitate ovary and fruit prickles (in R. cynosbati these are not capitate!).

Habitat and Management Implications

R. echinellum is a freely shoot-rooting species of well-drained sandy loams of rich woods in two widely separate localities. In the Florida area it is on southern and southwestern facing lake bluff with an overstory of hardwoods such as Liquidambar, Nyssa, Tilia, Ulmus, live oak, water oak, white oak, shumard oak, and pignut hickory. The understory is Cornus florida, Cercis, Palmetto, Forestiera, Viburnum, Sambucus. Logged areas of the Florida population show an increase of weedy shrubs, particularly Rubus, Sambucus, Smilax, and a reduction of the Ribes. Probably single tree or group selection would not effect the shrubs adversely, so long as this was kept from much mechanical disturbance of the soil. The shrubs are not found in full sun and it is thus quite likely that clearcutting would eliminate or seriously reduce them.

References

- Coville, F. 1924. Grossularia echinata, a spiny-fruited gooseberry from Florida. Journ. Agric. Res. 28: 71-74.
- Radford, A.E., H. E. Ahles and C. R. Bell. 1969. Manual of the vascular flora of the Carolinas: 519-520. Chapel Hill.
- Rehder, A. E. 1926. Ribes echinellum (Cov.) Rehder in "New species, varieties and combinations from the Herbarium and the collections of the Arnold Arboretum." Journ. Agric. Res. 28: 71.
- Small, J. K. 1933. Manual of the Southeastern flora, pp. 602-604. Chapel Hill.

SPECIES Ribes echinellum (Cov.) Rehd. Florida gooseberry

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X			NA	
Damage								X
No Lasting Effect					X	X		
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Ribes echinellum (Coville) Rehder



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SAXIFRAGACEAE

→ Saxifraga carevana Gray, Golden-eye saxifrage
~~Micranthes carevana (Gray) Small~~

Technical Description

Rosette-forming perennial herb from a short-fleshy caudex-like stem, perennating by short offsets from the erect crown.

Leaves.--The largest all basal, numerous and spreading, rather fleshy and stiffish, highly variable in size, from 3-5 cm long, the petioles ca. 1/2-2/3 the total leaf length, broadly linear, their backs broadly rounded, the upper side concave, proximally dilated abruptly to a clasping, reddish-villous-hairy, thin-bordered, villous-ciliate-margined base, dilated more gradually distally into the blade base; leaf blades mostly of a broad type, suborbicular to reniform or broadly ovate, apically rounded, marginally low-dentate, prominently coarsely dentate, or serrate-dentate, villosulous with brownish-red hairs, the tooth-tips often callused-apiculate, the base entire or nearly so, truncate or rounded, abruptly attenuated on the petiole, the upper surface sparsely to densely villous with weak pale hairs, deep green, the lower surface often reddish, appressed-or-erect-villous with longer, browner hairs.

Inflorescence.--Scapes mostly 15-30 cm high, erect, terete and ribbed, soft and brittle, pale green, spreading-villous with soft sordid hairs, these sometimes tipped with a red gland, bractless or with a few reduced, leaf-like bracts proximally, regularly forking-branched and scattered-bracteolate distally to produce a many-flowered cyme, the slender ascending-divaricate cyme branches sparingly glandular-villous and stipitate glandular.

Flowers.--Regular, bisexual on slender, stipitate-glandular pedicels to 1 cm long, usually these subtended by a small, erect bract-eole; hypanthium at anthesis very shallow; calyx lobes 5, triangular, green or tinged with red, ca. 1.5-2.0 mm long, acute, spreading, smooth; petals 5, spreading, distinct, elliptic or broadly lanceolate, ca. 4 mm long, white or pale pink, toward the base bimaculate, the spots yellow; stamens usually 10, distinct, from the narrow rim of the hypanthium, spreading-ascending, the slender, fleshy, teretish filaments white or pink-tinted, ca. 3 mm long, the yellowish, nearly round, basifixed anthers ca. 0.7 mm long; ovary nearly superior, of 2 distinct, whitish carpels ca. 2.5 mm long, these with white, conical bodies tapering distally into short, fleshy, divaricate styles, each with a capitate stigma.

Fruit.--Ripe follicles similar in shape to carpels but from base to tip of style beak ca. 5 mm long, spreading, thin-valved, smoothish; seeds numerous, elliptic-bicaudate, translucent, yellowish-brown, ca. 0.7-0.8 mm long, longitudinally multiribbed, some ribs crested with papillae.

Distribution and Flowering Season

Rocky moist woods, moist outcrops of acidic rock, usually in shade, Appalachians, mostly Blue Ridge, western North Carolina, eastern Tennessee; flowering from March through April.

Special Identifying Features

Of the symmetrical-flowered southeastern saxifrages whose filaments taper from base to apex, this is but one of two in Tennessee and the Carolinas that have bimaculate (2-spotted) petal bases. The other species, S. caroliniana Gray has filaments dilating distally (rather than tapering), has strongly clawed petal bases, and larger fruit.

Habitat and Management Implications

S. careyana frequents the moss mantle of wet, acidic rocks (phyllites, shales, granites, etc.) of steep slopes and cliff faces or ledges, is very often on the boulders and banks of plunging streams that empty into the larger streams and rivers. It may be in full sun of small clearings or areas of wet talus, but is always where moisture is high, nearly constant. Usually it is in the shade of a mixture of Canada hemlock, white pine, various hardwoods such as red oak, white oak, chestnut oak, black oak, hard maple, red maple, black locust, white ash, red hickory, bitternut hickory, various magnolia, yellow poplar, etc. The shrub layer is mostly ericaceous, containing Kalmia, Rhododendron, Leucothoe, Vaccinium, etc. Associated herbs are mostly carices, Scirpus, grasses in genera Poa, Bromus, Festuca, Panicum, and such forbs as Hepatica, Sedum, Mitchella, Krigia, Coreopsis, Senecio, Erigeron, Antennaria, etc. Many bryophytes, lichens, and ferns normally make up the surface of the thin mantle of soil or contribute the bulk of the organic matter the Saxifraga roots in. The habitat is steep, sensitive to erosion, thus it follows that heavy logging (where such is possible in that the terrain is often very steep) would, in addition to wrecking the slopes, open up the area to drying sun.

References

- Radford, A. E., C. R. Bell & H. E. Ahles. 1968. Manual of the vascular flora of the Carolinas, pp. 528-529. Chapel Hill, N.C.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 595-596. Chapel Hill, N. C.

SPECIES Saxifraga careyana Gray. golden-eye saxifrage

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA		X	NA	
Damage					X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Saxifraga careyana Gray



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SAXIFRAGACEAE:

Saxifraga caroliniana Gray [L-5] Carolina saxifrage
Micranthes caroliniana (Gray) Small

Technical Description

Rosette-forming, perennial herbs from short, fleshy stems, perennating by crown buds.

Leaves.--All larger ones basal, usually numerous, spreading, extremely variable in size (depending on depth, moisture and richness of substrate), stiffish, to 15 cm long, the petioles broadly linear, 1/3-2/3 the length of the blade, the backs broadly rounded, the upper surface flat or concave, proximally abruptly dilated to a clasping, brownish-villous base, distally slightly dilating into the blade; leaf blades flattish, somewhat succulent, sub-orbicular to oblong, ovate, apically rounded, the margins usually coarsely dentate, the teeth low-triangular or more narrowly triangular, tipped by an inconspicuous callus, the upper surface deep green, sparsely appressed-pilose with flattened pale hairs, the lower surface often paler or reddened, nearly smooth or scattered-pilose.

Scapes.--Erect, rigid and brittle, as variable in length as leaves, but consistently longer, terete, glandular-villous-pilose or pilose-glandular, usually bractless proximally but the inflorescence branches subtended by greenish, spreading or ascending, narrow linear or narrowly cuneate, sometimes apically toothed, bracts, these diminishing in size upward within the inflorescence.

Inflorescence.--Flowers arranged in a regularly forking compound of cymes, the slender branches spreading or slightly ascending, pilose-glandular, the whole compound usually oval in outline.

Flowers.--Regular, bisexual, on slender, stipitate-glandular pedicels of various lengths but rarely longer than 1 cm, each subtended by a small bracteole; hypanthium at anthesis very shallow; calyx lobes ca. 1.5 mm long, green, triangular, often reflexed in fruit, the narrow apex tipped by a reddish callus; petals 5, distinct, spreading, mostly 2.5-3.5 mm long, clawed, the blades narrowly oblanceolate or elliptic, white distinctly yellow bimaculate just above the blade base inside; stamens 10, spreading or erect, the slender filaments slightly clavate; ovary superior, the 2 distinct carpel bodies white, narrowly conic or lance-ovoid, from base to tip of slender, divergent styles ca. 2.5-3.0 mm long.

Fruit.--Follicles mostly 5-6 mm long from base to tip of persistent spreading style beak, the body lance-ovoid, excurved; seeds plumply short-cylindrical or ellipsoidal, 1-or-2-caudate, ca. 0.6-0.7 mm long, pale reddish-brown, translucent, longitudinally multiribbed, the ribs minutely papillate.

Distribution and Flowering Season

Shaded rocky ledges, slopes, cliffs, usually on acidic rocks, Blue Ridge and Valley and Ridge, western Virginia south into western North Carolina, northeastern Tennessee; flowering in May and June.

Special Identifying Features

S. caroliniana most closely resembles S. careyana, the only other species in the area that has yellow bimaculate petals (see writeup on S. careyana). The essential differences are the more stipitate petals, the narrowly clavate filaments of the stamens, and the larger fruit of the former.

Habitat and Management Implications

S. caroliniana is, like its close relative S. careyana, a plant of cool, shaded, surfaces of acidic rocks, and is usually rooted in a thin mantle of highly humified detritus mixed with moss. Most of its associate species are various carices, shade grasses, and a variety of ferns. The substrate is usually very moist, often misted with spray from plunging water, or variously supplied with seepage such as trickles down the shaded rocks. The terrain is invariably steep. The overstory varies somewhat, in some cases being primarily coniferous, usually with hemlock, white pine, mixed with hardwoods such as red oak, yellow birch, black birch, sugar maple, red maple, buckeye, basswood, magnolia, etc., and an understory largely ericaceous, composed of Rhododendron (usually R. maximum), Leucothoe, Kalmia, Vaccinium, etc. Clethra acuminata is often present, together with Rubus odoratus. However, in Valley and Ridge Virginia, the overstory may be largely of hardwoods, with very few conifers. In either event, the sites are steep, but locally may produce conifer and hardwood lumber of high quality. The slopes and soils are such that, if logging is heavy, much damage to the sensitive bluff habitat is done because of mechanical disturbance of the highly erodable soils, admission of too much light together with several woody weeds. The end result is that the character of the herbaceous vegetation is changed.

References

- Radford, A. E., C.R. Bell & H. E. Ahles. 1968. Manual of the vascular flora of the Carolinas, pp. 528-529. Chapel Hill, N.C.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 595-596. Chapel Hill, N. C.

SPECIES Saxifraga caroliniana Gray. Carolina saxifrage

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA		X	NA	
Damage					X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Saxifraga caroliniana Gray



HAMAMELIDACEAE

Fothergilla gardeni Murr. Dwarf-witch-alder

Technical Description

Shrubs 1 meter or less tall, simple or profusely branched from the base.

Stems.--Soboliferous, the erect or ascending primary shoots unbranched or with several ascending lateral branches. Shoots slender but stiffish, gray-brown or reddish-brown, the older growth smooth, the thin outer bark cracking longitudinally, the new shoot growth densely tomentose with stellate-edged scales.

Leaves.--Alternate, ascending, deciduous, estipulate, numerous on shoots and on frequent spur shoots, 2.5 - 5.0 cm long, obovate, oblong or broadly cuneate, rather firm, the apices truncate or broadly rounded, low-toothed, the margins at least toward the base entire or undulate, somewhat revolute, the base cuneate, somewhat oblique, the upper surface dark yellow-green, dull, stellate-puberulent, the lower surface paler, more densely stellate-hairy (at least when young), often stellate tomentose with blonde or reddish-brown hairs; petioles short, round, stellate hairy.

Inflorescence.--Flowers at shoot tips, sessile in pseudo-whorls, in rather compact oblong white spikes 3-5 cm long, the internodes elongating as fruit develop, each flower subtended by a short, ovate, tomentose bract.

Flowers.--Sepals fused with receptacle into a short (3-4 mm) campanulate, pale-tomentose hypanthium, the calyx lobes very reduced, forming a more or less scaly rim. Petals absent. Stamens numerous, the filaments club-shaped, ca. 5 mm long very white, slightly flattened, the anthers small, yellowish, reniform. Ovary half-inferior, densely tomentose, 2 carpellate, styles 2, filiform, later the carpel tips grading acuminate into 2, spreading, persistent beaks.

Fruit.--Capsule broadly ovoid, scurfy-hairy, nearly 1 cm long, woody, with 2, shiny brown, oblong seed to 5 mm long, all very similar to Hamamelis.

Distribution and Flowering Season

Pineland bog margins, pocosins, savannas, Coastal Plain from eastern North Carolina intermittently southward to north Florida, thence west into northwest Florida and southern Alabama. Flowering March into May.

Special Identifying Features

F. gardeni, mostly a Coastal Plain species, is a lower shrub with more pubescence, smaller, narrower based leaves, smaller flowers, shorter stamens, smaller fruit than the more interior and montane F. major (Sims.) Lodd.

Habitats and Management Implication

E. gardeni is a plant of acidic, highly humified sands that are permanently wet; a good place to look for it is in sparingly pine-forested pocosins and on the shrubby edges of pitcher plant bogs. It is usually a part of dense shrubbery, associated with Myrica, various Vaccinium and Gaylussacia, Persea, Magnolia virginiana, gallberries, etc. In the eastern parts of its range there is usually some pond pine mingled with longleaf pine in the overstory. It is

plainly part of a community in which fire was, and is, critical to its maintenance. It is a plant of full sunlight or very light shade, and probably increases with the reduction of competition through clear-cutting or burning. Any site preparation involving drainage, combined with bulldozing, rootraking, chopping, would eliminate the species, with bedding being the least undesirable.

References

- Radford, A. E. et al. 1968. Manual of the vascular flora of the Carolina, pp. 530-531. Chapel Hill, N.C.
- Small, J. K. 1933. Manual of the southeastern flora, p. 601. Chapel Hill, N.C.
- Weaver, Richard E. 1969. Studies in the North American Genus Fothergilla (Hamamelidaceae). Jour. Arnold Arb. 50:599-619.

SPECIES: #81 Fothergilla gardeni Murr. Dwarf witch-alder

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X				
Damage			X				X	?
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Fothergilla gardeni Murr.



Agrimonia incisa T. & G. [H]

Status: Threatened

Technical Description:

Solitary or in small clumps, perennial, the stems arising from a compact, small, tuberous-thickened caudex, increasing by imbricate-scaley lateral buds, the roots diffuse-fibrous, sometimes tuberiferous.

Stems: erect or ascending, simple or few-branched, but usually wand-like, mostly 5-10 dm tall, at base above thickened rootstock ca. 3-4 mm thick, terete, tapering gradually upward, hairy with 3 sorts of hairs, namely scattered-hirsute, incurved-puberulent and, particularly toward base, strigose, the nodes several, approximate toward base, more distant upward on stem.

Leaves: alternate, ascending or spreading, once-odd-pinnately compound, the largest to 1 dm long, strongly stipulate, the stipules foliaceous, broadly reniform, half-clasping the stem, strongly and saliently triangular-dentate; lowermost leaves mostly absent by flowering time, leaving only sheathes and stipules, those in lower 1/3 of stem largest, grading somewhat smaller up about halfway, then more or less abruptly reduced and distant, the inflorescence axis leafless; larger blades short-petiolate, interruptedly pinnate, the leaflets mostly opposite, sometimes staggered, the larger ones to ca. 2 cm long, the terminal slightly largest, all narrowly obovate or cuneiform, apically rounded or obtuse, strongly and saliently triangular-dentate or serrate, the tooth tips narrowly acute, often with a small tuft of long stiff hairs and somewhat recurved, the leaflet base usually broadly to narrowly cuneate, sessile, the smaller leaflets also sessile, less than 1/2 as long as the larger ones, variable in outline and fewer-toothed, the upper surfaces of leaves dark yellow-green, impressed-pinnate-veiny, soft puberulent, the lower surfaces paler, strongly raised-veiny, inconspicuously sessile-glandular, scattered-pubescent, also villose-tomentulose, the leaf rachis hairy as in stems.

Inflorescence: Racemes spikelike, rarely few-branched, usually simple, terminal, slender, the flowers numerous, the lowest, particularly in fruit, distant, but internodes shortening upward, each pedicel subtended by a small, chaffy-scaley, few-toothed, strigose and ciliate bract.

Flowers: Pedicels short, 1 mm long or less, jointed to and reflexed from an ascending, stiffish, apically cupuliform, scarious-bracted peduncle to ca. 3 mm long (shorter at anthesis), the peduncle and pedicel usually puberulent-villosulous; flowers perfect, regular, the hypanthium at anthesis broadly campanulate or turbinate, ca. 2 mm high, green, hairless, externally pebbled with round, translucent resin-droplets, rimmed apically by many suberect, stiff, yellowish uncinata (like fish hooks) bristles; sepals 5, at anthesis spreading, triangular-ovate, ca. 2 mm long, acute, green, glabrous, the backs gland-pebbled as in hypanthium; petals 5, short-clawed, spreading, ca. 3.0 mm long, elliptic or obovate, pale yellow; stamens mostly 5,

alternating with petals on hypanthial rim, the filaments pale yellow, smooth, erect, slender-tapering, ca. 2 mm long, terminating in a fleshy connective wider than long, the anther sacs lateral, narrowly reniform, the whole connecting with the filament to form a broad-headed "T"; ovary mostly inferior, at apex nearly even with hypanthial rim, there forming a fleshy disc concave in the middle from which arise 2 (-3) distinct, erect or slightly divergent, short-linear styles. Fruit: a pair of planoconvex nutlets ca. 2.0-2.5 mm long, the pericarp pale brown, parchmentlike, incased in the hypanthium, this by fruiting time broadly turbinate-obovoid, ca. 2.5-3.0 mm long, the base attenuate, the rim with inwardly hooked stiffish bristles 2.0-2.5 mm long and capped by the persistent green convergent sepals which make a cone above the fruiting styles.

Distribution and Flowering Season:

Sandy open woodlands, dryish ravine heads, bluffs and small clearings, Coastal Plain, North Carolina south to northern Florida and west into southern Mississippi; flowering in August and September.

Special Identifying Features:

This Agrimony is distinguished from the others by a combination of characters such as the small leaflets, even the terminal one at most barely exceeding 2 cm and the leaflet margins which are very coarsely and saliently few-toothed.

Habitat and Management Implication:

A. incisa is infrequent in sandy, usually upland woods in the Lower Coastal Plain. It appears to be always a part of the Longleaf Pine-deciduous scrub oak type, is rooted in deep dryish sands or sandy loams, usually with the overstory an open stand. Occasionally it will be in shade of open stands of more mesic character (i.e. Beech-Maple-Magnolia) but only in the ecotonal sense. Its herbaceous associates are almost consistently those typical of dry sandy sites, and include Aristida (mostly A. purpurascens, A. lanosa), Andropogon, Panicum, Gymnopogon, Erianthus, Paspalum, Triplasis, Triodia (flava, caroliniana), Digitaria, Leptoloma, Cenchrus, Cyperus retrorsus, C. plukenetii, Rhynchospora grayii, Paronychia, Polygonella, Dicerandra, several Euphorbia, Stillingia, Cnidoscolus, Croton argyranthemus, C. glandulosus, many Desmodium and Lespedeza, Stylosanthes and very many species of composites in Liatris, (particularly L. gracilis, L. tenuifolia, L. graminifolia), Heterotheca (especially H. trichophylla, H. gossypina, H. graminifolia, H. adenolepis), Solidago (S. odora, S. tortifolia, S. petiolaris, S. arguta), Vernonia (particularly V. angustifolia) Silphium (S. asteriscus, S. compositum), Kuhnia, Aster (A. concolor, A. linariifolia, A. patens, etc.). All these are suggestive of the droughtiness and fire susceptibility of such sites. The shrub layer is made up of many Vaccinium, Gaylussacia, Opuntia, Poison Oak, Winged Sumac, Ceanothus, Ilex ambigua, Rubus cuneifolius, various Smilax, Crataegus uniflora, Prunus umbellata and other shrubs of dry woodlands.

This particular species has become, or seems to be, very local

in that much of the original Longleaf pineland has been replaced by plantation pineland. It does not appear readily to move into mechanically disturbed sites. It is a fire successional species, like many other pineland herbs increasing as a result of competition being reduced by natural woods fires.

References:

Radford, A.E.H.E. Ahles & C. Ritchie Bell. 1968. Manual of the vascular flora of the Carolinas, pp. 455-457.

Small, J.K. 1933. Manual of the southeastern flora, pp. 615-616.

SPECIES: Agrimonia incisa T. & G.

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		X		X			X	
Damage No Lasting Effect			X					X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Estimated Range of:
Agrimonia incisa T. & G.



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ROSACEAE

Geum geniculatum Michx. Bent-avens

Technical Description

Rosulate and caulescent perennial herb from a stout, ascending caudex and a diffuse-fibrous root system.

Rootstock.--Caudex covered by chaffy, dark-brown remnants of old leaf bases and stipules, these bristly-ciliate.

Stems.--Erect or ascending, simple, branched only in the inflorescence, terete, to 1 meter tall, toward base purplish, retrorsely hirsute-hispid, upwardly becoming greenish or green tinged with purple, increasingly hirsute, the hairs more spreading and admixed with spreading puberulence, toward tips and in branches of inflorescence with hairs often gland-tipped.

Leaves.--Both basal and alternate on stem: rosette leaves persistent, spreading to erect, the stiffish petioles usually much longer than the blades, often purplish-tinted, spreading or retrorsely hispid-hirsute, proximally ribbed but terete, distally strongly grooved above, the blades reniform to suborbicular or obovate, simple to lyrate-pinnatifid or trifoliolate, the margin coarsely and irregularly sharp-toothed, the simple blades apically rounded, often incised, or shallowly trilobed (as in red maple), the bases rounded, truncate or cordate, the pinnately lobed blades with terminal blade much the largest, ovate to suborbicular or even reniform, often shallowly trilobed, the uppermost lateral divisions ranging from nearly as large to abruptly much smaller, inequilateral, the median and lower laterals in distant pairs, usually much smaller, inequilateral, acute, cuneate-based, the trifoliolate blades with petiolules, the terminal leaflet again largest, the laterals spreading all usually obovate, unevenly serrate, sometimes also incised-lobed, cuneately based; stem leaves progressively shortening upward on stem, ultimately sessile, the stipules broadly ovate to lanceolate, foliaceous, acute, entire or serrate, the bases broadly to narrowly cuneate, the blades trilobate or trifoliolate, mostly ovate-lanceolate or ovate, unevenly serrate, also often incised-lobed, the bases cuneate, usually entire; upper leaf surfaces hirsute, deep yellow-green, lower leaf surfaces hispid-hirsute, sometimes also puberulent.

Inflorescence.--A strongly bracteate system of few-to-many-flowered cymes, the branches (on larger plants) stiffly ascending at ca. 45° angles, rather densely hirsute and puberulent, with bracteal leaves progressively narrowed and smaller in the inflorescence, the stiffish, erect to ascending slender pedicels longer than the flowers.

Flowers.--Regular, perfect; hypanthium shallow, narrow, its margin bearing short-oblong bractlets 2-3 mm long just below the sharp calyx sinuses; receptacle convex, often white-pilose; calyx lobes persistent, 5, ca. 7-8 mm long, ovate-triangular, the backs green tinged with maroon, strigose-hirsute, also puberulent and glandular

the margins ciliate, the upper surface smooth, green; petals 5, distinct, obovate-cuneate, 0.7-10.0 mm long, ascending, the broad, wavy distal margin emarginate, the smooth surface white or white strongly suffused with broad bands of pink or purple, very veiny; stamens very many from the hypanthial rim, the greenish-white filaments dilating and flattened proximally, slightly shorter than the sepals, the ellipsoidal anthers reddish-brown, 1.0-1.2 mm long; carpel bodies numerous, distinct, oblanceolate in outline, green, dorsiventrally compressed, hirsute, apically slender, often glandular-hairy; style very elongate, fully 1 cm long, slender, the lower half smooth or proximally glandular-hairy, at its tip with one close loop, above this the slender erect upper half spreading pilose, terminating in a narrow, short-linear stigma.

Fruit.--Akenes ca. 0.4-0.5 mm long, the body ascending-pilose-hirsute, somewhat margined, the style persistent (at least to the middle or to the coil).

Distribution and Flowering Season

Moist rocky woodlands, edges of balds, local toward summit elevations in the Blue Ridge of western North Carolina and eastern Tennessee; flowering from July to early September.

Special Identifying Features

Geum geniculatum, excepting G. radiatum, another rare species of the high southern Appalachians, is the largest flowered species of southeastern area Geum. G. radiatum however is at once distinguished by its very showy large yellow petals and its unbent style; the petals of G. geniculatum are white, greenish-white or pinkish-purple-tinted. G. geniculatum may be distinguished from all southeastern Geum by the length of its styles (fully 1 cm) which are at the middle coiled; the other southeastern Geum have styles coiled (geniculate) above the middle.

Habitat and Management Implications

This rare Avens is seemingly found above about 4,000 ft. altitude and only on a few summits. It is located under or around hardwood forests made up of Betula lutea, B. lenta, Sorbus americana, Aesculus octandra, Prunus pennsylvanica, Fagus, Quercus rubra, Acer spicatum, A. pennsylvanicum, A. saccharum, etc., these species often admixed with red spruce and Fraser fir. The understory often has heavy growth of several heaths, but particularly Rhododendron catawbiense, R. maximum, R. calendulaceum, Lyonia, Vaccinium; other shrubs are Rubus odoratus, Ribes, Viburnum alnifolium, Sambucus pubens, Diervilla, etc. I have not seen this species unless it is heavily admixed with composites

such as Aster acuminatus, Eupatorium rugosum, Prenanthes, other herbs such as Impatiens pallida, Laportea. Many ferns and lycopods are present, along with the montane Oxalis acetosella and dense carpets of mosses. The Geum, while often locally abundant, is often hard to see because of associated herbs and ferns, and often only the tops of it are visible. The substrate is moist, acidic, very well drained, but never drying out, always highly organic. Such soils accumulate amongst the granite-bouldery talus that has developed at or toward the summit elevations. It must be emphasized that this Geum is a shade plant, while its rare neighbor, G. radiatum, is a plant of sunlight, thus the former is liable to increase as mature forest develops and the latter to decrease, particularly as Rhododendron enroaches on its area.

Over much of its narrow geographic range this plant is now protected, in that it is largely in either state or national forest or in protected private land (i.e. Grandfather Mountain, Bluff Mountain). Thus the overstory that is so essential to it is being preserved, as it should be since this shade dependent species would fast disappear if the cover were cut away, the openings resultantly being filled by grasses or more aggressive understory shrubs, and the soils drying excessively.

References

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Cambridge, Mass.
- Gray, A. 1841. Notes of a botanical excursion to the mountains of North Carolina. Am. Journ. Sci. 42: 1-49.
- Rydberg, P. A. 1913. Rosaceae, in North Am. Fl. 22: 406.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 6.7-619.
Chapel Hill, N. C.

SPECIES Geum geniculatum Michx. Bent avens

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA		X	NA	X
Damage					x			
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Geum geniculatum Michx.



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ROSACEAE

Geum radiatum Michx. [1-1] Spreading avens
Sieversia radiata (Michx.) Greene

Technical Description

Perennial, the older plants forming large, dome-like tufts from lateral, ascending rhizomes that are thick, brown-chaffy and fibrous.

Stems.-- Usually arising singly from rhizome tips and from strong rosettes, to 5 dm tall, hirsute or hispid-hirsute.

Leaves.-- Basal rosette leaves by far the largest, on luxuriant specimens fully 3 dm long, the petiole usually 3-4 times as long as the blade, terete, pale green, hispid-hirsute with yellowish hairs, its base abruptly dilated, clasping, with broad, thin margins, the blade either simple or lyrate-pinnate, the terminal segment much the largest, suborbicular to reniform, (5-) 10-15 (-20) cm broad, irregularly and many-toothed, often narrowly and deeply incised, the lateral pairs of leaflets (when present) of few to several pairs, mostly 1.5 cm long or less, distant, spreading, variously toothed and incised, usually inequilateral, cuneate-based; the upper surface deep yellow green, scattered-strigose, the lower surface paler, strigose-hirsute, particularly along the several palmate, major veins, the petiolar surface coarsely hirsute; stem leaves abruptly smaller, ascending, mostly ovate, obovate or rhombic, lacerately serrate, often also deeply incised-lobed.

Inflorescence.-- A few-flowered, rather narrow cyme or a raceme, the slender, erect, villous and hirsute pedicels at anthesis longer than the flower.

Flower.-- Showy, regular, bisexual; hypanthium at anthesis saucer-shaped, ca. 6-8 cm broad, green, villosulous and strigose-hirsute; calyx lobes 5, spreading, triangular, acuminate, 6-8 mm long, green, the tips thickened and blunt, alternating with 5, short-linear, blunt-tipped sinus appendages, all strigose-hirsute externally, lanulose above toward the tips; petals 5, obcordate, spreading, mostly 1.0-1.5 mm long, a deep, clear yellow grading to orange at the cuneate base and often bearing medially below the petal "notch" a short, ridgelike appendage within; stamens numerous around hypanthial rim, spreading and erect, 4-5 mm long, the filaments pale yellow, ca. 4 mm long; carpels numerous, erect, distinct, the narrowly fusiform-ellipsoidal ovaries silvery-silky-tomentose, ca. 4 mm long, tapering into narrow, erect, pale green, smooth styles fully as long or longer.

Fruit.-- Akenes erect, the body lanceolate in outline, somewhat compressed, silvery pilose, ca. 5 mm long, tapering into a persistent erect smooth style fully 1 cm or more long.

Distribution and Flowering Time

Clearings in mountain heath balds at summit elevations, southern Appalachians, western North Carolina and eastern Tennessee; flowering from June into August.

Special Identifying Features

There is no other Geum in the southeastern area that remotely resembles this species, it being nearest taxonomically to G. peckii of the White Mountains

of New Hampshire and north into Nova Scotia. There are no other southern species in this section (Sieversia) which is distinguished in part by its persistent, straight or but slightly bent, non-jointed styles. G. radiatum is the most ornamental of southeastern area geums, its flowers by far the largest.

Habitat and Management Implications

G. radiatum is usually found rooted in dark, highly humified moist sandy Toams in crevices in granitic rocks or in grass balds or grassy clearings in heath balds at summits of the higher mountains in the Appalachians along the North Carolina-Tennessee border, thus usually at elevations of 5000 feet or more. The forest at these elevations is normally Picea rubens-Abies fraseri, but the Geum is never under these trees. It is definitely a plant of full sun and loses ground to increasing clones of Rhododendron catawbiense, Alnus, other shrubs, or forest reproduction. The Rhododendron is usually the prime culprit in crowding or shading it out. It is locally abundant in a few localities, most of which are public land. Much of its endangerment apart from its being shaded out by competing shrubby vegetation, comes from irresponsible construction of park or forest facilities such as parking lots, trails or public buildings within its area.

References

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- Michaux, A. 1803. Flora Boreali-Americana, p. 300. Paris.
- Radford, A.E., H.A. Ahles and C.R. Bell, 1968. Manual of the vascular flora of the Carolinas, pp. 542-545. Chapel Hill, N.C.
- Small, J.K. 1933. Manual of the southeastern flora, p. 618. Chapel Hill, N.C.

SPECIES Geum radiatum Michx. Spreading avens

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	NA	NA	NA			X	
Damage								
No Lasting Effect								
Beneficial if Done Properly					*	*		

Other Comments: *Removal of shrub and reproduction competition would benefit this plant.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Geum radiatum Michx.



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ROSACEAE

Neviusia alabamensis A. Gray [L-7]

Technical Description

Thicket-forming, irregularly-arching-branched, often straggly shrubs to 2 m high, much in bloom like Spiraea, the bark of old shoots gray or gray-brown, exfoliating.

Twigs.--Slender, zig-zag, the winter buds ovoid, ca. 3 mm long, imbricate, acute, the numerous scales with castaneous backs and pale-ciliate margins; new shoots greenish, pale-strigillose; second season and older shoots rib-angled, reddish-brown, smooth or with some pale persistent hairs.

Leaves.--Alternate, simple, stipulate, deciduous, the paired stipules lance-subulate, ca. 3 mm long, at first pale green, later castaneous and chaffy, strigillose-hirtellous, clasping with outer margin decurrent on twig, the petioles sprading-ascending, terete, to 1 cm long, pale yellow green, strigillose, the blades ovate, rhombic, elliptic or broadly lanceolate, when mature 3-8 cm long, acute, irregularly doubly serrate or serrulate, the sharp teeth tipped with red glands, the base rounded or broadly cuneate, the upper surface deep green, nearly smooth or scattered-strigose, the main venation pinnate, somewhat impressed, the lower surface gray-green, more densely pale-strigillose, the raised veins pale, strigo-tomentose.

Inflorescence.--Flowers rarely solitary from axils on new shoots, more often from short spur shoots or axillary buds of previous season in (2-) 3-6 (-8) flowered umbel-like corymbs.

Flowers.--Regular, perfect, on slender, terete, strigillose pedicels 2-3 cm long. Sepals 4-5 on a cup-shaped green, strigillose hypanthium ca. 3 mm high, the lobes spreading, obovate or oblong elliptic, 5-8 mm long (longer in fruit), toward the rounded to acute or bifid apex lacerate or incised-serrate, the teeth narrow and gland tipped, the surface green suffused medially and distally with white, strongly parallel-ribbed beneath. Petals 0. Stamens very many, crowded around the wide hypanthial rim, erect or ascending, the filaments white, lineal, smooth, subterete, 5-10 mm long, the anthers glabrous, pale yellow, ca. 0.5 mm long. Carpels 3-5, distinct, the ovoid bodies white-strigo-tomentose, 1.0-1.5 mm long, the lineal, erect, pale yellow-green styles 3-5 mm long, toward base strigillose, distally smooth, the excurvate apex with a linear, glandular stigma.

Fruit.--Akenes 1-5 in the persistent hypanthium and leafy calyx, tumid, asymmetrically ovoid, 4-5 mm long, slightly compressed laterally and with a narrow, low rim, brown or greenish-brown with a scattering of appressed white hairs.

Distribution and Flowering Season

Rocky river bluffs and ravines various provinces, northern Alabama, middle Tennessee, northwestern Mississippi, southern Missouri, Arkansas; flowering from March into May.

Special Identifying Features

Neviusia is monotypic, its closest relatives asian, such as the genus Kerria. It is distinguished from other southeastern rosaceous plants by a combination of woody habit, simple leaves, calyx foliaceous, petals absent, carpels distinct and ripening into somewhat fleshy akenes.

Habitat and Management Implications

Neviusia is a shrub of light to heavy shade, is usually rooted in the thin soil formed over shales or limestones or the bouldery detritus from outcrops of same. The substrate appears to be basic or neutral, with or without a high increment of loam. Vegetational zones on the steep slopes it grows upon are many and complex, thus the shrubs may be found along bluff edges as part of a mixed oak-hickory-yellow pine complex, lower down as understory to mixed mesophytic forest, or at ravine bases in small rocky bottoms where several lowland forest species may be present. It has some strange, sometimes equally rare, associates when one considers these over the total range. Its Alabama habitat may support Croton alabamensis, Sedum nevii, Cheilanthes alabamensis; its Arkansas habitat may support Cotinus obovatus, Delphinium newtonianum. In my own experience the best habitat appears to be in mixed mesophytic woodland, often along limestone-shale contacts, sometimes with sandstone detritus eroded from overlying formations. While the shrubs are easily propagated and are said to be hardy well to the north of the natural range, it is not wise to assume that they react well to careless logging practise. The soils of the steep terrain frequented by Neviusia would be subject to severe erosion were the forest clearcut. Shrubs in ravine bases would have bases buried in wash from upslope logging. Too much opening of the canopy would result in an invasion of undesirable woody competition, particularly Rubus, Lonicera, Symphoricarpos, Smilax and noxious herbaceous vines.

Gray, A. 1858. Neviusia, a new genus of Rosaceae. Mem. Amer. Acad. Arts & Sciences, New Ser. Vol. VI:58-376, pl. XXX.

Moore, D.M. 1956. Neviusia alabamensis in Arkansas. Rhodora 58: 187-191.

Small, J.K. 1933. Manual of the southeastern flora, pp.605-606, 625. Chapel Hill, N.C.

SPECIES Neviusia alabamensis A. Gray

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	NA	NA	NA		X	X	
Damage					x			
No Lasting Effect								X
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Neviusia alabamensis A. Gray



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ROSACEAE

Prunus geniculata Harper A scrub plum

Technical Description:

Non-soboliferous, scraggy, heavily but irregularly branched, broad crowned shrub to 2 meters tall, the bark of older stems thin, gray (usually lichen-encrusted), cracking into irregularly rectangular or squarish plates.

Twigs.-- Twigs of young or normal growth strongly zig-zag, the lateral branches either forming short, stubby spur shoots or strongly tapering, spine-like; bark of new shoots lustrous reddish-brown or purplish, often at first puberulent, becoming smooth toward end of season; bark of older growth a lustrous gray, cracking longitudinally into a braided pattern revealing a reddish inner bark; terminal bud absent, laterals ovoid-triangular, ca. 2 mm long, the scales reddish-brown with smooth backs and ciliate margins.

Leaves.-- Alternate, smooth, appearing crowded on spur shoots, rather distant, spreading or ascending on normal shoot growth; stipules linear-subulate, ca. 5 mm long, pectinately fringed with reddish glands, green, smooth; leaf blades ovate to obovate or elliptic, mostly 1-3 cm long, short-acuminate, regularly serrulate with teeth tipped by reddish glands, the base rounded or broadly cuneate, on a reddish, slender petiole 1/3-1/2 as long as the blade.

Flowers.-- Regular, bisexual, developing singly from buds lateral to axillary buds, appearing before leaves, rather crowded on spur shoots, more distant on spine bases or along vigorous shoots, spreading on short, smooth green pedicels slightly if at all exerted beyond subtending bud scales (thus appearing sessile); hypanthium funnellform, green-tinted with maroon or red, ca. 3 mm long, smooth; calyx lobes 5, spreading-ascending, triangular, acute, sparsely ciliate, reddish or green, the backs smooth, the upper surface white-tomentulose; petals 5, spreading, ca. 5 mm long (flower at anthesis ca. 1.0-1.3 cm broad), white, the ovate to obovate blades with rounded tips, their bases attenuated to short, ciliate-margined claws; stamens numerous, more or less erect on hypanthial rim, ca. 5 mm long, the slender, terete, linear filaments white, smooth, tapering to nearly round, versatile, yellow anthers 0.5 mm long; ovary superior, lance-ovoid, ca. 3 mm long, smooth, tapering apically to a linear, smooth style 5-6 mm long, this terminating in a buttonlike stigma.

Fruit.-- On stalks to 3 mm long; drupe ovoid or ellipsoidal, 1.2-2.5 cm long, dull reddish, the stone but slightly flattened, but with a groove ventrally, the flesh tin and bitter.

Special Identifying Features

Prunus geniculata differs from all other plums of Florida in the sessile appearance of its small, fragrant flowers. As its discoverer Dr. Harper (1911) has stated, its affinities appear to be with the common and widespread, soboliferous Chickasaw Plum, but this shrub does not appear to form thickets, and its fruit in character is more like that of P. umbellata, the Sloe.

Also, the mature leaf blades are not folded peachlike as they are in P. angustifolia. In short, this little species is very distinct from the other Florida plums.

Habitat and Management Implications

P. geniculata occurs on deep "yellow" sands of longleaf pine-turkey oak sandhills as well as on "white" sands of sandscrub dominated by evergreen scrub oak, various ericads, and sand pine. As in true of many other woody species frequenting sandhills in the longleaf pine type, it responds vigorously to fire disturbance and historically was probably fire maintained. The primary threat to the species now is through the development of much of its habitat into housing and orange groves.

References

- Harper, R.M. 1911. A new plum from the lake region of Florida *Torrey* 11: 67.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 646-650.

SPECIES Prunus geniculata Harper. Scrub plum

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	X	X			X	
Damage								*
No Lasting Effect								
Beneficial if Done Properly	x (moderate)				X	X		

Other Comments: *Some Prunus are toxic to livestock!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Prunus geniculata Harper



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ROSACEAE:

Waldsteinia lobata (Baldw.) T. & G. ¹⁰⁰ Piedmont strawberry

Technical Description

Perennial herb, producing rosettes at tips of very elongate, brownish, shallowly-set, forking rhizomes 2-5 mm thick, or sometimes rhizomes producing flagelliferous and stoloniferous shoots along which the leaves are alternate, scattered.

Leaves.--All but oldest portions of rhizome covered by a densely overlapping "shag" of brownish or reddish-brown scale leaves; rosette leaves numerous, erect or spreading, 10-20 cm long, mostly petiole, the abruptly dilated, reddish petiolar bases clasping the abbreviated stem (rhizome) tip in a tight spiral, this usually subtended by spirals of reddish, hispid-hirsute and long-ciliate, narrowly triangular scale leaves 1.0-1.5 cm long; petioles slender, hirsute, sometimes scattered-puberulent also, proximally reddish, distally greenish, terete, low-ribbed; leaf blades reminiscent of many Ribes, suborbicular to broadly ovate or reniform, mostly 3-8 cm long, deeply to shallowly incised-lobed, the principal divisions mostly 3-5, broadened distally, the sinuses very narrow, the segment margins variously incised, also rather coarsely and unevenly serrate-dentate; upper blade surface dark yellow-green, strigose-hirsute and densely hirsute with shorter hairs along the veins, these often with a scattering of reddish, sessile glands; lower blade surface markedly paler, the pubescence heavier with some long-stiff hairs, but mostly downy, and particularly dense along the major, palmately disposed, veins.

Inflorescence.--Peduncles equal to or slightly shorter than the petioles of foliage leaves, 1-few per shoot, erect, axillary to chaffy, triangular, reddish-brown bracts just below the foliage leaves at rhizomal tips, slender, terete and channelled, hispid-hirsute, also puberulent with hairs spreading to somewhat retrorse, medially bearing 1, linear bractlet, the flowers few to many, usually somewhat scattered along the axes of a variously spreading pair of indeterminate racemes mostly 4-6 cm long, the slender spreading pedicels villosulous and hispid-hirsute, ca. 1 cm long, each subtended by a foliaceous, linear to oblong or spatulate, acute, sparingly low-toothed or entire, hispid-hirsute bract 0.5-2.0 cm long, these bracts gradually reduced toward raceme tips.

Flowers.--Regular, bisexual, at anthesis ca. 1 cm broad; receptacle strongly pilose-hispid; hypanthium green, funnelform, ca. 3 mm high, hispid-hirsute, glandular; calyx lobes 5, green, triangular, spreading, ca. 3 mm long, sparsely ciliate, the upper surface villosulous-cinereous, the backs hispid-hirsute and sparsely glandular; stamens very many, distinct, spreading or erect from hypanthial rim, the slender filaments slightly flattened, yellowish, ca. 3 mm long, the dorsifixed anthers yellow, broadly oblong, ca. 1 mm long; petals 5, bright yellow, distinct, spatulate or oblance-

colate, spreading, equal to calyx lobes or slightly shorter; carpels 2-3, distinct, basally attached, the body compressed-obovoid, ca. 2 mm long, villosulous, the slender style ca. 3 mm long, early deciduous, its base sparsely soft-hairy, jointed to the ovary apex and terminating in a narrowly capitate stigma. Fruit.--Akenes similar in shape to carpel bodies, ca. 3 mm long, plumper, villosulous-tomentose.

Distribution and Flowering Season

Acidic, shaded, rocky ravines and creek or river bluffs, Piedmont and Blue Ridge, Georgia and northwestern South Carolina; flowering from April into May.

Special Identifying Features

W. lobata differs from the other 2-3 taxa of the southeastern area in its broader leaves which are merely incised rather than divided and in the pubescent (rather than smooth) style bases. This plant differs also in the extreme length of its rhizomes which often attain lengths of a meter or more.

Habitat and Management Implications

W. lobata is a shade plant, growing on deep to shallow sandy loams in acid-rocky woods, often a part of the shallow mantle of moss and duff that covers boulders or bluff ledges. Common associated genera are Galax, Mitchella, Asplenium, Polystichum, Dryopteris, Hepatica, Sanguinaria, Hexastylis, Tiarella, Trillium (particularly T. cernuum, T. cuneatum, T. catesbaei), Polygonatum, Erythronium, etc. The substrate has a high sand fraction, is very well drained, usually moist (but seasonally becoming dry). The steep sites it frequents often have dense growths of Rhododendron (particularly R. maximum, R. minus) and Kalmia. The overstory varies, a reflection of the complex metamorphic geology of the region, in that calcareous rock (such as marble) may be nearby as well as acidic rock. Thus the dominant species may be oak-hickory-pine, oak-pine-juniper, or in the richest, deepest ravines, mixed mesophytic with much beech, hard maple, buckeye and ash.

This plant is too rare for many conclusions to be reached about its present abundance related to past occurrence. Small (1933) indicates a range that includes the Piedmont of the Carolinas but current listings of the flora of the Carolinas do not include W. lobata. I have seen it only in or near areas where marble is presently being quarried and can state that this activity is totally destructive of the habitat. In that the plants occupy rather shallow, at least seasonally moist, soils under light to heavy shade, it would follow that heavy logging

would be risky. This would be true particularly of Piedmont Georgia where clearcutting of the forest or even moderate logging is often followed by an invasion of noxious herbaceous and woody weeds such as Lonicera, Pueraria, Smilax, Rubus, etc., which tend to crowd out spring flowering herbs. It is suggested that this species be considered endangered rather than threatened.

References

- Small, J. K. 1933. Manual of the southeastern flora, pp. 616-617. Chapel Hill, N. C.
- Torrey, John and Asa Gray. 1838-1840. Flora of North America I, P. 426. New York.

SPECIES Waldsteinia lobata (Baldw.) T. & G. Piedmont strawberry

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	X	X	X	X		X		
Damage					X			X
No Lasting Effect								
Beneficial if Done Properly								

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Waldsteinia lobata (Baldw.) T. & G.



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FABACEAE !)

Apios priceana B. L. Robinson ⁵⁷ Price's groundnut
Glycine priceana (Robinson) Britton

Technical Description

Herbaceous perennial, sometimes rampant, vine from a stoutish, thickened tuber.

Stems.--Twining, also somewhat twisted, terete and also low-ridged, yellow-green or tan, smooth or with a scattering of stiff hairs, forming a large vine.

Leaves.--Alternate, the stipules linear with a round attachment scar, odd-pinnately compound, mostly 2-3 dm long, spreading on slender but stiff, sparingly pubescent petioles one-third to one-half the length of the leaf; leaflets on stalks 3-5 mm long, spreading, 5-9, mostly 7, broadly to narrowly ovate, the lowest pair usually the largest, acuminate, entire, the bases rounded, the upper surface at maturity smooth, dark yellow-green, reticulate, the lower surface paler, puberulent, reticulate-veiny.

Inflorescence.--All but the lower leaves bearing rather compact panicles or racemes 5-9 cm long on stout, hairy stalks 3-4 cm long. Flowers one or more in axils of pale green, ovate, hairy, acuminate bracts, on pedicels 3-5 mm long, in total length ca. 2 cm.

Flowers.--Calyx a thin, pale green, villous cup ca. 3-4 cm high, this bearing at its lower edge a very narrow projecting lobe ca. 3 mm long. Corolla as in pea or bean, brownish-green with maroon tints, when viewed from the side strongly curved outwardly below, concave on the keeled greenish-yellow or pink standard blade above, this blade folded over most of the rest of the corolla and longest, its tip fleshier than the rest, beak-like, its base short-auricled; wings oblong linear, short-clawed, each bearing a short auricle basally; keel petals rather fleshy, strongly curved upward and linear, blunt, short clawed.

Fruit.--Pods 13-20 cm long, linear, somewhat turgid, the base cuneate, the apex abruptly attenuated into a prominent slender beak, the surface smooth, the valves firm with somewhat thickened margins. Beans oblong, smooth, dark brown, 7-8 mm long.

Distribution and Flowering Season

Rocky wooded slopes and floodplain edges, middle Kentucky southward through middle Tennessee into northern Alabama and Mississippi. Flowering from late June into August; fruit maturing in August.

Special Identifying Features

This plant is distinguished from A. americana Medic as follows:

1. The leaves are larger, the leaflets usually with one pair more.
2. The standard petal (uppermost petal) is larger, pink or with yellow-green tints rather than purple-maroon (as in A. americana), bearing at its tip a thickened, mucro-like appendage. In A. americana

the standard tip is blunt, even emarginate.

3. The fruits are longer, with the shorter ones about equal to the longest ones produced by A. americana.

Habitat and Management Implications

A. priceana is usually found under mixed hardwoods or in clearings therein, usually where ravine slopes or banks break into creek or river bottoms. It is on well-drained loams either on old alluvium or over calcareous boulders.

This is such a rare plant that little is yet known for sure of its response to disturbance, grazing, etc. It has been collected in secondary growth hardwood forest, thus is known to survive in the wake of logging. I have observed it in an area of recent burning and it may be conceded that it may react well to fire disturbance as do many other leguminous plants that have large tuberous rootstocks (Gleason, 1952, measured some rootstocks to be 18 cm wide!) However, the very rarity of the plants is an indication that this species has a narrow ecological amplitude.

References

- Gleason, H. A. 1952. Illustrated flora, ed. 3, Vol. 11: 448-449. New York.
- Small, J.K. 1933. Manual of the southeastern flora, p. 723. Chapel Hill, N.C.

SPECIES Apios priceana B.L. Robinson

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X	NA	NA				
Damage					X	X		?
No Lasting Effect								
Beneficial if Done Properly	X							

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Apios priceana B. L. Robinson



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FABACEAE

5-7

Astragalus tennesseensis A. Gray Tennessee milkvetch; Milk vetch
Geoprimum tennesseense (A. Gray) Rydb.

Technical Description

Perennial herbs from strong, stout taproots.

Stems.--Usually several, arising from short, stoutish branches at summit of taproots, usually spreading over the ground, arching upward toward the tips, mostly 2-7 dm long, pale green or straw colored, simple or sparingly branched, with several close-set leafless nodes toward the base, thickening upward, there densely long-spreading-hairy with whitish hairs.

Leaves.--Alternate, even-pinnate with stipules pale green, thin, ovate, acuminate,, ciliate, about 1-2 cm long, leaf rachis spreading, 5-15 cm long, long-spreading-hairy, less than 1/2 petiole; leaflets between 10 and 20 pairs, spreading on short (ca. 1mm.), hairy stalks, mostly elliptic or oblong, 5-15 mm long, the apices rounded or emarginate, often with a small mucro, the margins entire and long ciliate, the upper surfaces dark yellow green, smooth, the lower surfaces with long, appressed hairs.

Inflorescence.--Flowers in long-stalked compact racemes from the axils of mid-stem leaves upward, the stalks spreading-ascending, spreading-long-hairy, mostly 5-10 cm long, the racemes ovoid or cylindric, mostly 3-8 cm long, each flower with a pale green, thin, erect lanceolate or narrowly ovate, acuminate, long ciliate bract 5-10 mm long and on a short stalk 1.5-2.0 mm long.

Flower.--Calyx narrowly campanulate, long-hairy, 5-lobed, the tube 8--10 mm long, yellow-green, the lobes unequal, narrowly triangular to nearly linear, green, to 3 mm long. Corolla pale yellow, pea-like but narrow, the standard longest, bent upward toward its tip, narrowly obovate, retuse, 1.5-2.0 cm long; wing petals long clawed, the blades oblong, rounded-tipped; keel petals shortest, sharply bent upward. Stamens 10, hidden by the petals, 9 joined by their filaments most of the length, the 10th distinct, all smooth. Ovary superior, hairy, narrow, the style bent upward at its tip.

Fruit.--Narrowly ovoid-cylindric, 3.0-3.5 cm long, long beaked, vary thick-walled and fleshy, persistently long-hairy, becoming brownish and wrinkled when fully ripe. (Racemes of fruit are usually persistent long after the leaves have withered, lying flat on the ground with the browning remnants of stems and leaves).

Distribution and Flowering Season

Dry calcareous prairies and barrens, northern and central Illinois; middle Tennessee; northern Alabama. Flowering April into May.

Habitat and Management Implication

This species, wiped out or nearly so in its Illinois range, is now most abundant (through local) in the cedar glades of middle Tennessee, less so in small or large clearings in limerock woods. It is a plant of full sun or very light shade, usually on very thin soils over limestone and associated with other calciphiles such as Psoralea subacaulis, Delphinium virescens,

Petalostemon, Onosmodium, Arenaria patula, Talinum, various carices and grasses. The woodlands associated with the clearings are marked by Juniperus virginiana, Quercus shumardii, Q. muhlenbergii, Q. alba, Morus rubra, Ulmus serotina U. rubra, U. Americana, Carya ovata, C. carolinae-septentrionalis, Rhamnus, Fraxinus, with Rhus aromatica and Symphoricarpos common in the understory. The soils, while fertile, are thin and poorly drained, being sticky clay in winter and spring, drying to bricklike consistency in summer and fall drought.

A. tennesseensis, a plant of open areas, may increase as clearings are produced through logging. Its decrease over the total range is probably due mainly to conversion of the land to row crops or pasture on the one hand and the encroachment on its area by scrub forest on the other. Historically it may have been maintained through summer and autumn fire.

References

- Quarterman, Elsie. 1950. Major Plant Communities of Tennessee Cedar glades. Ecology 31: 234-254.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 708-709.

SPECIES: #34 Astragalus tennesseensis A. Gray, Milk vetch

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		NA					X	
Damage								
No Lasting Effect	NA							Poisonous
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Astragalus tennesseensis A. Gray



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FABACEAEBaptisia arachnifera Duncan, Hairy wild-indigo

[1-3]

Technical Description

Perennial, all parts densely cobwebby-white-tomentose, from short, stout rootstock.

Stems: Erect, to 1 meter tall, branching prolifically from near the base to form leafy crowns broader than high. All branches round in cross section, zig-zag, reddish-brown but appearing gray because of heavy tomentum.

Leaves: Numerous, alternate, lacking stipules, broadly ovate or nearly round, the larger ones 5-8 cm. long, leathery, gray-green, the apex rounded, obtuse-angled, rarely emarginate, the margins entire, the bases nearly sessile, rounded or cordate. Leaves gradually reduced in size upward on the branches grading into roundish or lanceolate small bracts.

Inflorescence: Flowers numerous in slender, stiffish elongate racemes at branch tips, from close-set to somewhat scattered, particularly toward the raceme base as fruit develops. Flower stalks ascending or erect, tomentose, to 3 mm. long.

Flowers: Calyx 6-7 mm. long, gray-tomentose, broadly and obliquely bell-shaped, the 5 narrowly triangular lobes somewhat unequal, slightly longer than the calyx tube. Corolla yellow, 11-12 mm. long, the standard petal somewhat shorter than the wings and keel. Stamens 10, all separate.

Fruit: Densely pale-cobwebby-tomentose, on a stalk 3-4 mm. long, the body nearly round, 8-10 mm. long, strongly margined along the valve edges, tapering abruptly into a slender-tipped beak nearly as long as the body.

Distribution and Flowering Season

Sandy slash or longleaf pine-saw palmetto-galberry flats or low sandy rises therein, southeastern Georgia. Flowering late June into July.

Special Identifying Features

This species is perhaps the most distinctive in the genus, its bright yellow flowers and the silvery sheen of its cobwebby hairy foliage bringing it into sharp contrast in the pinelands. It is the only sessile and simple-leaved, estipulate southeastern Baptisia which has such a quality and quantity of pubescence.

Habitats and Management Implication

B. arachnifera has a small range, being known from only Brantley and Wayne counties. There it may be abundant locally on sandy roadsides, old fields, or rather open pine flatwoods and plantations. It is another fire controlled species, being most abundant in pine-saw palmetto-galberry where there is evidence of recent fire. From such areas it will seed into sites prepared

for pine, and is not infrequent in plantations where stems are of pulpwood size or larger. However, as pine plantations age to where growth of pine is dense, it and nearly every other associated herb, disappears.

Reference

Duncan, W. H. 1944. A new species of Baptisia. Rhodora 46 (542); 29-31.

Revised March 1980

SPECIES: #55 Baptisia arachnifera Duncan, Hairy wild-indigo

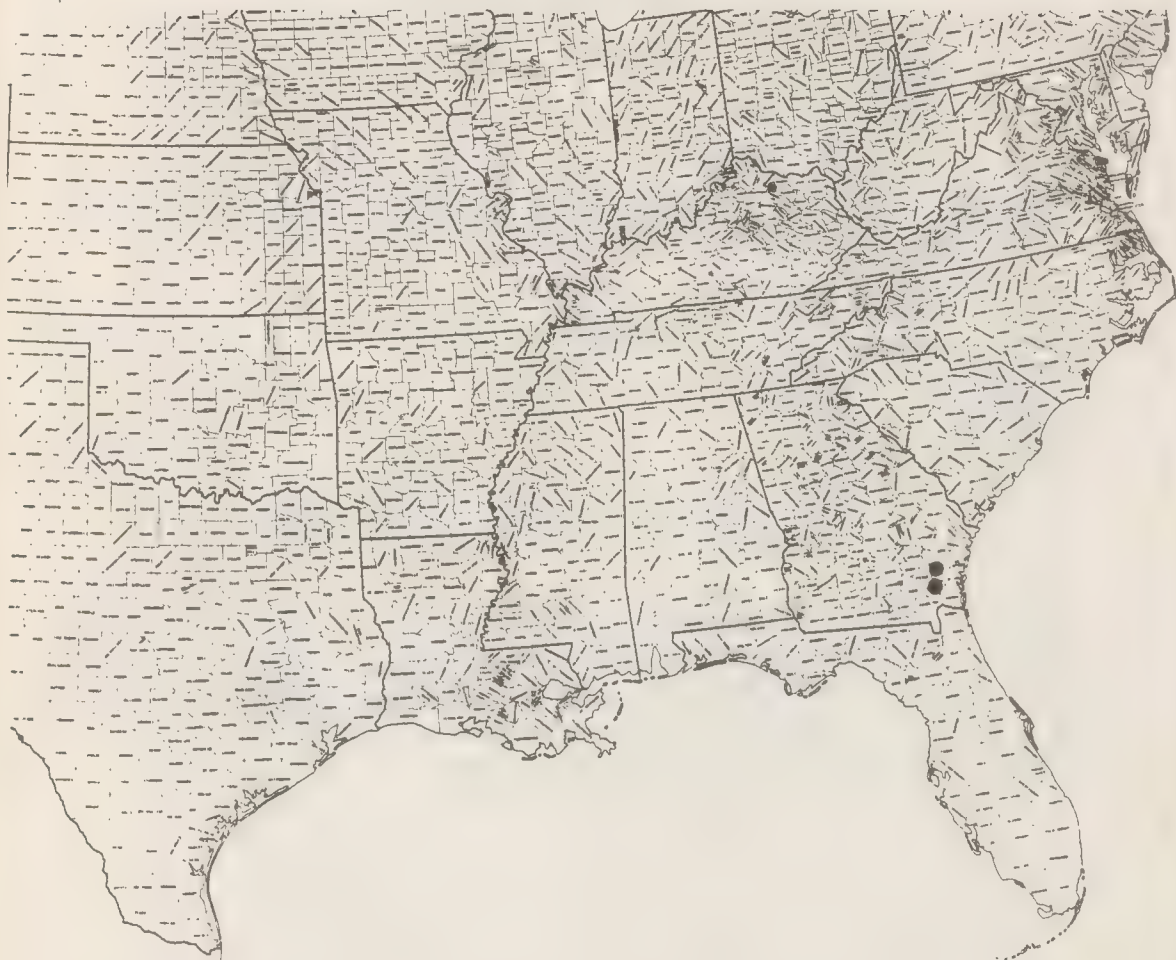
Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X				
Damage			X					
No Lasting Effect							X	X
Beneficial if Done Properly	X				X	X		

Other Comments: With a balance of age classes and freshly site prepared areas, this species should always be present.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Baptisia arachnifera W. Duncan



100

245
FABACEAE;

15-31
Baptisia calycosa Canby, pineland wild-indigo
or Wild Indigo

Technical Description

Bushy, densely leafy, smoothish, perennial herbs from stout rootstocks.

Stems.--Usually with 1 erect central axis, this pale green, somewhat glaucous between 5 and 10 mm thick, this with several spreading or ascending branches from near the base to the summit, these rebranching from nearly every node to form a roundish dense crown fully as broad as high or broader, the whole plant 5-10 dm tall.

Leaves.--Alternate, trifoliate, near sessile, stipulate, the stipules 1-2 cm long, elliptic linear, elliptic or lanceolate; leaflets 3, oblanceolate, mostly 2-3 cm long, nearly equal, pale yellow green (turning black on drying), obtuse to rounded, the margins entire, ciliate with a scattering of long white spreading hairs, the bases narrowly cuneate, the surfaces smooth or nearly so, very finely reticulate.

Inflorescence.--Flowers arising singly from the axils of simple narrowly ovate or lanceolate bracts, numerous in rather open, elongating racemes on slender spreading-ascending stalks 2-5 cm long, these stalks with a pair of opposite, smaller bracts shortly below the flower.

Flowers.--Calyx in bloom about 1.5 cm long, green, the tube campanulate, about 3 mm long, the lobes unequal, leafy spreading-ascending, broadly oblanceolate, broadly acute, with short uncus, usually ciliate, cuneate-based. Petals clear yellow, the corolla about 1 cm long, the standard somewhat shorter than the wings and keel, nearly round, the wings oblanceolate, the keel petals bent upward along the keel. Stamens 10, all filaments distinct, all smooth. Ovary smooth, with a slender, upswept style.

Fruit.--Ovoid, the body with the valve edges forming keels, clasped by the sepals, about 1 cm. long on a stipe about 3 mm. long and with a persistent slender style beak, black when ripe, smooth.

Distribution and Flowering Season

Sandy longleaf pinelands, particularly low sandy rises in pine flatwoods, northeastern Florida. Flowering late June and July.

Special Identifying Features

This particular wild-indigo looks at first glance like B. lecontei in flower and leaf, but its calyx lobes are much larger and foliaceous while those of B. lecontei are no longer than the calyx tube. It is nearest B. hirsuta, a plant of northwestern Florida, in calyx character, but that plant is much more pubescent, the hairs of B. calycosa being confined to the margins of leaflets and sepals.

Habitats and Management Implication

B. calycosa is found always on deep sands, usually amidst a scattering

of longleaf pine, scrub oak (particularly Q. laevis), saw palmetto and associated with numerous dry soil grasses and sedges, particularly Andropogon, Aristida, Panicum (Dichanthelium) Bulbostylis, Cyperus (C. filiculmis, C. retrorsus, C. plukenetii). It may be found in sandy exposures transitional to pine flatwoods. In any event, it is part of longleaf pine savanna or longleaf pine-deciduous scrub oak types, both associations constituting fire disclimax. Within its small range (mostly in Clay, St. Johns counties) it appears to be most abundant and vigorous in recently burned over pinelands, least abundant where forest is heaviest. It will persist in pastures and on the edges of pine plantations. Clear cutting would favor its increase, as would any site preparation which would reduce shrub or tree competition without severely altering the soil. Prescribed burning would of course favor its increase.

References

Lairsey, Mary M. 1940. A monograph of the genus Baptisia.
Ann. Mo. Bot. Gard. 27: 119-224.

Small, J. K. 1933. Manual of the southeastern flora, p. 676.

SPECIES: #130 Baptisia calycosa Canby. False Indigo or Wild Indigo

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X				
Damage			X					
No Lasting Effect							X	X
Beneficial if Done Properly	X				X	X		

Other Comments:

if seed source
near some are
suspected
poisons

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Baptisia calycosa Canby



245
FABACEAE!

100

Baptisia hirsuta Small [1-3]

Status: Threatened

Technical Description:

Bushy perennial mostly 3-8 dm high from a large, knotty, often irregularly roundish or short-cylindric crown, this with thick, very deep roots, perennating by means of crown buds.

Stems: stiffly erect or ascending, 1-several per crown, regularly ascending-branched, usually from near the base and prolifically rebranching to produce a broadly rounded or oval crown; lower part of stem stoutish, to 1 cm thick, tapering regularly upward, the branchlets proportionately more slender, stem and branches terete, low-ribbed, greenish-yellow or greenish-brown, villous-hirsute or even shaggy tomentose with white hairs.

Leaves: alternate, stipulate, the lowermost on approximate nodes, scale-like, the largest (along main stem) with paired, foliaceous elliptic to oblanceolate or lanceolate, acute, entire stipule blades 1.0-1.5 cm long, the leaves palmately trifoliate, the petiole mostly 3-5 mm long, the leaflets spreading, obovate to oblanceolate, subequal, 1-3 cm long, rounded to acute or obtuseangled, often mucronulate, entire, the base broadly to narrowly cuneate, on short, villous petiolules, a pale dull green, the surfaces at first white-villous-hairy, villous-ciliate, later becoming smoother save on veins and margins; upper stem and branch leaves (bracts) becoming simple, elliptic, oblong or broadly lanceolate, similar in color and hair to lower leaves, the lowermost as long as leaflets of larger leaves, but progressively reduced in size toward branch tips,

Inflorescence: a leafy-bracted raceme, the pedicels slender, reddish, shaggy-white-villous, widely ascending from all or nearly all leaf axils of branchlets, and each bi-bracteate above the middle, in length from several times to slightly longer than the flowers, the longest ones lowest on the branchlet.

Flowers: bisexual, irregular, spreading, the calyx of 5 subequal sepals, fused at base into a broadly campanulate, shaggy-white-pilose tube 4-5 mm high, the lobes elliptic or broadly oblanceolate, about 1 cm long, erect, acute, pilose-ciliate, colored like leaves and scattered-pilose, overtopping the petals; petals 5, the corolla papilionaceous, the petals distinct, pale yellow, the banner ca. 8 mm long, short-stalked, broadly obovate or broader than long, retuse, folded along the midnerve and projecting forward in the flower, the wing (lateral) petals with flat claws ca. 3.5 mm long, the oblong-lanceolate, rounded-tipped blades pointing forward, flat, ca. 9 mm long, the base auriculate, the larger auricle dorsal (uppermost), the keel petals slightly longer, the flat claw equal in length to that of the wings, the blade oblong-obovate, broadly rounded-tipped, bearing a prominent basal reflexed auricle dorsally at base, the lower edge more strongly curved than the upper; stamens 10, distinct, all pointing forward around the ovary, subequal, ca. 1 cm long, the filaments pale, slender, terete, tapering at tip to pale yellow, dorsifixed, ellipsoidal anthers; ovary superior, stipitate, the body fusiform, ca. 3 mm long, tapering into a slenderly linear,

abruptly upswept stylar apex, this tipped with a short stigma, the stylar surface pilose from base to ca. 2-3 mm below the stigma. Fruit: legume somewhat woody, brown, on a stipe 4-5 mm long, the broadly ovoid or ellipsoidal body ca. 1 cm long, scattered pilose-hirsute, more densely hairy along the margined valve edges, abruptly narrowing into the linear-subulate persistent style base; seeds few, oblong-ellipsoidal, laterally somewhat flattened, ca. 3 mm long, smooth, olivaceous.

Distribution and Flowering Season:

Sands of Longleaf Pine-deciduous scrub oak woodlands, northwestern Florida; flowering mostly in May.

Special Identifying Features:

The most distinctive character held by this Wild Indigo is its very leaflike calyx lobes which at anthesis project forward, largely concealing the yellow petals, actually overtopping them. There is but one other species in the southeast which has that calyx feature, namely B. calycosa Canby, an endemic of northeastern peninsular Florida in the St. Johns River drainage in sandy pine flatwoods savanna. However, that species is glabrous, whilst this one is very pubescent, its pale villosity in the field giving the foliage a distinctive grayish aspect.

Habitat and Management Implication:

B. hirsuta decorates the deep yellow sands of Longleaf Pine-Turkey Oak sandhills and flats mostly between Defuniak Springs and Crestview in panhandle Florida, its small round crowns of gray - green foliage distinctive even at a distance. The original pine has long ago been mostly logged out, the stocking now is poor and of low quality so that most of the area has gone over to open or rather dense stands of scrub oak dominated by Q. laevis, but with liberal representation of Q. incana, Q. margarettia, Q. geminata. Where the oak and associated scrubland hardwoods are densest the Baptisia is scarce or absent. Where, through fire, logging disturbance or other wood cutting, the woods have been opened up, or where powerlines or rights of way for railroad and highway have been created, the Baptisia is most abundant, there associated with such sandscrub herbs as Aristida, Sporobolus, Eragrostis, Panicum, Andropogon, Cyperus (particularly C. filiculmis), Bulbostylis ciliatifolia, B. warei, Yucca, Commelina erecta, Tradescantia hirsuticaulis, Stipulicida, Paronychia, various Euphorbia, Polygala polygama, Lechea, Oenothera fruticosa, Opuntia, many legumes, particularly Desmodium, Lespedeza, Psoralea canescens, Indigofera caroliniana, Lupinus diffusus, L. villosa, L. nuttallii, Phlox nivalis, Onosmodium virginianum, Lithospermum carolinense, Ruellia, Dyschoriste oblongifolius, and many more, including very many Asteraceae, particularly (during the flowering time of the Baptisia) Silphium, Phoebanthus tenuifolia, Berlandiera pumila, Erigeron strigosus, Tetragonathea helianthoides, Hymenopappus scabiaeosus, etc. Low, clonalizing shrubs such as Chrysobalanus oblongifolius, Rhus toxicodendron, Gaylussacia dumosa and running oaks are common.

This sort of habitat, once the original pine had been removed,

languished until after World War II, after which increasingly large acerages were converted to plantation pine or to varied (some abortive) real estate ventures. In the case of pine plantings, large acerages are site prepared mechanically. Such plants as the Baptisia will readily move into the disturbed areas, providing seeding plants are left in adjacent area. However, they are shaded out as the growing crowns of the young pines close over.

References:

- Lairsey, Maxine. 1940. A monograph of the genus Baptisia.
Ann. Mo. Bot. Gard. 27: 119-242.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 674-678.

SPECIES: Baptisia hirsuta Small

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy							X	
Damage								X
No Lasting Effect		X		X				
Beneficial if Done Properly	X				X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Known Distribution of:
Baptisia hirsuta Small



g45
FABACEAE

Baptisia megacarpa Chapm. ex Torr. [5-7] Streamside wild indigo

?B. riparia Lairsey

Technical Description

Perennial legume from tough, fibrous, deep rootstock.

Stems.--Solitary or several from the crown, to fully 1 meter long (-1.5 meters), the leafless stem base usually stout, terete, smooth, pale green, often glaucous, divaricately branching, zig-zag and rebranching distally, thus forming a broad, yet shallow crown.

Leaves.--Palmately bi-or-tri-foliolate on spreading-ascending petioles, these sparsely hirsute at very base, and much shorter than the leaflets; leaflets spreading, obovate to narrowly or broadly elliptic or rarely ovate, mostly 5-15 cm long, apically narrowly rounded or acute, entire, the bases mostly cuneate, the upper surface dark yellow-green, smooth, the lower surface very pale, markedly reticulate, smooth or sparingly hirsute along the midrib and main lateral veins; stipules early deciduous.

Inflorescence.--Flowers few to many in both terminal and axillary indeterminate racemes on slender peduncles longer than the petioles of subtending leaves, usually spreading-drooping, the spreading-ascending pedicels losing their narrow, scale-like, bracts by anthesis. Racemes, including peduncle, highly variable in length, mostly 5-15 cm long.

Flowers.--Regular, zygomorphic, fully 2 cm long on slender, smooth pedicels at anthesis ca. 1 cm long, in fruit to 2 cm, the calyx at anthesis ca. 1 cm long or slightly less, campanulate, the orifice slightly oblique, the limb slightly bilabiate, the teeth 4, triangular, shorter than the tube, the upper tooth shorter and broader than the lower 3, apically bidentate, the outer surface pale green, smooth, raised-veiny, the inner surface villosulous; corolla papilionaceous, cream, the petals 5, projecting forward, clawed, the banner ca. 1.5 cm long, its blade broadly ovate to sub-orbicular, retuse, the wing petals slightly longer with oblong, round-tipped blades, the keel petals longest, ca. 2.0 cm, their blades excentrically oblong, apically rounded, proximally auricled; stamens 10, distinct, ca. 1.5 cm long, the slender but flattened pale filaments projected forward around the ovary, hidden in the curvate keel, the yellow, ellipsoidal, basifixed anthers ca. 1 mm long; ovary superior, including the long style about as long as the stamens, the body lance-linear, slightly laterally compressed, nearly smooth to hirtellous, strongly stipitate.

Fruit.--Legume broadly obovoid, broadly ellipsoidal or broadly short-cylindric, very bladdery-inflated, mostly 3-5 cm long, the valves thin, pale brown, glabrous, the veins forming a raised fine reticulate, the stipe hidden in the persistent calyx, the slender style persistent, ca. 1 cm long. Seeds numerous, in outline elliptical,

somewhat compressed laterally, smooth, ca. 3 mm long.

Distribution and Flowering Season

Moist shaded ravine slopes, streambanks, bluffs and rises in sandy bottoms, northwest Florida, southwest Georgia and southeast Alabama; flowering from late April to early June.

Special Identifying Features

This tallish, broad-crowned, woodland species has a somewhat confused taxonomy; extremes of it may be actually what has been called B. riparia Lairsey and B. riparia var. minima Lairsey. These, described from flowering, not fruiting material are supposed to be distinguished by their narrower leaflets and hairier ovaries, but such characters appear to blend into extremes of B. megacarpa. It is probably best to refer to all cream-petaled, short-racemed, smoothish, trifoliate Baptisia which have thin-walled, inflated legumes, if they are from riparian systems of that area, as B. megacarpa.

Habitat and Management Implications

B. megacarpa grows in light to deep shade, or at edges of woods, is rooted in fine sands, sandy loams or sandy alluvium, sometimes on sandy rises in large bottoms. The overstory may range from mixed mesophytic to pine-hardwood with the common pines being loblolly or spruce pine, the commoner hardwoods being willow oaks, elm, hickory, ash, bull bay, yellow poplar and sweet gum. It is in sites that rarely dry, but which at the same time would rarely flood. It is normally associated with spring woodland herbs that require well drained, moist, loamy substrates and which tend to disappear when the overstory is removed. The rich sites in which this plant grows are excellent for quality hardwoods and pine and as a consequence are being, or have been, heavily logged; this may in part explain the comparatively rare occurrence of B. megacarpa, though some good localities may support hundreds, even thousands, of plants. Selective logging, if this does not result in severe mechanical disturbance or erosion of the sloping sites, probably has no adverse effect. Clear cutting poses a danger for several reasons, even if there is not mechanical site preparation. First, full sun and subsequent drying and loss of humus from such sites, would be detrimental. Second, the advent of Lonicera japonica, Rubus, Smilax, Pueraria, all of which tend to crowd out original ground cover in such disturbed habitat, would eliminate this species.

References

Lairsey, Mary M. 1940. A monograph of the genus Baptisia.
Ann. Mo. Bot. Gard. 27: 119-244.

Small, J.K. 1933. Manual of the southeastern flora, pp. 674-678.

SPECIES Baptisia megacarpa Chapm. ex Torr. streamside wild indigo

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy	NA	X	X	X		X		
Damage								
No Lasting Effect								X
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Baptisia megacarpa Chapm. ex Torr.



FABACEAE

Baptisia simplicifolia Croom, coastal-plain wild indigo,
~~Sears-weed or Wild Indigo~~

Technical Description

Perennial legume from a knotty stout rootstock.

Stems.--One or few, smooth, stiffish, erect, to 1 meter tall, at base 7-10 mm thick, round but ribbed and cracking longitudinally, branching prolifically from near the base to form a bushy, leafy, broad crown, the branches somewhat zig-zag, tan or with reddish-brown tints.

Leaves.--Alternate, simple, lacking stipules, nearly sessile, leathery, smooth ovate, broadly elliptic or obovate, 5-10 cm long, obtuse but apiculate, entire and revolute, the bases broadly acute or broadly cuneate, the upper surface dark green, lustrous (leaves dry black), the lower surface much paler and finely reticulate.

Inflorescence.--Flowers produced in terminal, slender, spikelike racemes and on slender, stiffish, ascending stalks 3-4 mm long, each stalk subtended by a small, narrowly lanceolate bract.

Flowers.--Calyx broadly bell-shaped, smooth, about 5 mm long, the 5 lobes broadly or narrowly triangular, about as long as the calyx tube. Corolla clear yellow, 1.3-1.5 cm long, the standard blade about as broad as long or broader, erect, somewhat shorter than the wing and keel petals which project forward, the keel strongly curved upward. Stamens 10, all separate, smooth.

Fruit.--When young with cobwebby white hairs, becoming smooth and nearly black when ripe, on a stipe 4-5 mm long, the narrowly ovoid body about 10 mm long, with a persistent slender style beak fully as long or longer.

Distribution and Flowering Season

Sandy pinelands, northwestern Florida. Flowering late July, August.

Special Identifying Features

This and two other species, B. perfoliata and B. arachnifera are the only southeastern Wild Indigos which lack stipules and at the same time have simple leaves. B. arachnifera, similar in inflorescence has ovate foliage covered with cobwebby hairs; B. perfoliata has a broader, perfoliate leaf and produces its flowers singly in leaf axils. Neither of these overlaps the range of B. simplicifolia.

Habitats and Management Implication

This species is always associated with longleaf pine-deciduous scrub oak. It may be on sand ridges or in the drier flats, sometimes interspersed with saw palmetto, gallberry and a variety of heaths such as Vaccinium, Gaylussacia, Kalmia, and Lyonia. Of the grasses, wiregrass is its commonest associate.

The plants are not infrequent in sapling or larger sized plantations, seeming to seed in from adjacent natural stands. Site preparation involving clearcutting or prescribed burning tends to increase it, together with other relatively shade

intolerant forbs but as plantations form dense crowns closure this Baptisia is not found. Common mechanical methods of preparation involving discing, raking, chopping, etc. eliminate this plant. Optimal habitats are recently burned pineland savanna, where, in Leon, Liberty and Gadsden counties, the species is locally abundant.

References

Lairsey, Mary M. 1940. A monograph of the genus Baptisia. Ann. Mo. Bot. Gard. 27: 119-224.

Small, J. K. 1933. Manual of the southeastern flora, pp. 674-678.

SPECIES: #56 *Baptisia simplicifolia* Croon. Scare-weed or Wild indigo

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X					
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Baptisia simplicifolia Croom



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FABACEAE!

Clitoria fragrans Small, Sweet-scented butterfly-pea

Martiusia fragrans Small

Technical Description

Subshrubby, perennial, smoothish herbs from a stout, woody caudex, this producing very deep, thick, linear-clavate roots.

Stems.--One-to-(usually) many, slender but stiffly erect or ascending, terete, 3-7 dm tall, deep green tinged with purple, slightly glaucous, usually leafless toward the base at flowering time, only the paired, triangular-ovate, scale-like stipules persisting, simple or sparingly ascending-branched from mid-stem up, there very slender and zig-zag, minutely puberulous.

Leaves.--Alternate, trifoliolately compound, persistently stipulate, the stipules scale-like, narrowly ovate-triangular, strongly ribbed, reddish-brown, ca. 3 mm long (smaller toward stem tips); petioles colored as in stems, slender, spreading-ascending, minutely puberulous, the length various but usually about as long as the lateral leaflets subtended; leaflets 3, pinnate, the larger ones mostly 2-5 cm long, firm, linear to oblong, narrowly elliptical or narrowly lanceolate, rounded to obtuse or shallowly emarginate, mucronulate, entire, slightly revolute, the bases rounded to short petiolules, these subtended by short, triangular-linear, purplish stipels; upper surface dark green, strongly reticulate with a scattering of minute, hooked hairs, the lower surface markedly paler, raised-reticulate, smooth or sparingly strigose along the major veins.

Inflorescence.--Flowers both chasmogamous and cleistogamous, the former showy, (1-) 2 (-3) on spreading-ascending, axillary, stout, purplish peduncles slightly shorter than subtending petioles, apically bearing 2 pairs of purplish, narrowly-triangular, scale-like bracts 2-3 mm long, these subtending stiffish, erect or ascending, puberulent, pale green pedicels 3-5 mm long.

Flowers.--Perfect, zygomorphic, spreading; chasmogamous flowers large, showy, with a faint fragrance, subtended by a pair of purplish, narrowly triangular, rigid scalelike bracteoles ca. 5 mm long, the calyx narrowly funnelform, gamosepalous, indistinctly bilabiate, ca. 1 cm long to the base of the deepest sinus, the lower lip ca. 7-8 mm long, deeply cleft into 2, narrowly triangular, subulate teeth, the upper lip deeply cleft into 3 more broadly triangular teeth; surface externally puberulent, green with teeth purplish; petals 5, distinct, the banner half-moon-shaped in bud and folding sharply over the rest of the petals, when expanded 4-5 cm long, obovate or even rhombic, the bulk of the blade bent upward, pale blue with purplish prominent veins and a broad, whitish basal-medial "eye"; wing petals much shorter than the banner, projecting

forward and largely concealing the 2 keel petals, oblanceolate or spatulate, yellowish-white; keel petals shorter still, strongly clawed, the small, broadly oblong blades very curved on the lower margin; stamens 10, smooth, diadelphous, projecting forward and upward, 1.5-1.8 cm long, the 9 fused filaments joined to above the middle, the basifixed pale yellow anthers ca. 1 mm long, erect; ovary superior, smooth or minutely hooked-hairy, linear-upcurvate, ca. 1 cm long, prominently stipitate, the style more slender, upcurved, ca. 7-8 mm long, distally pilose, the stigma very small, capitate.

Fruit.--Ripe legumes oblong, somewhat flattened laterally, 3-5 cm long (exclusive of persistent style base or "beak"), 7-9 mm broad, exserted beyond the calyx on an uncinat-puberulent stipe fully 1.0-1.5 cm long, splitting along both sutures to expose a row of 3-9 broadly oblong to subglobose or angular, dark brown, smooth beans 3-4 mm long and broad.

Distribution and Flowering Season

Very local in scrub, central part of southern peninsular Florida; showy flowers (chasmogamous) produced mostly in May and June; cleistogamous flowers intermittently produced later in season.

Special Identifying Features

This Clitoria is distinguished from others of the southeastern area by its more consistently erect (versus viney) habit, its much narrower, usually lineal or oblong, leaflets, and particularly by the very long stipe of the ovary and fruit (in C. mariana, the southeastern species nearest it taxonomically, the stipe of the ripe fruit does not protrude beyond the calyx).

Habitat and Management Implications

C. fragrans consists now of a very few, scattered populations in the sandy scrublands of two counties in southern Florida. It is deeply rooted in deep, yellow or white, sands, the primary roots and branch roots much like very long, spatulate fingers. Most of the time it is found in sandy clearings in the scrub; sometimes it occurs in very open scrub. The overstory, where present, may be of scattered longleaf pine, slash pine or sand pine, these associated with both evergreen and deciduous scrub oaks, several ericaceous shrubs and a scattering of saw-palmetto. Associate herbaceous species on these dryish sites include Selaginella arenicola, many Dichanthelium Panicum, Cenchrus, Andropogon, Aristida, Stipa avenacea, Sporobolus fuscus, Cyperus retrorsus, C. filiculmis, Bulbostylis waresii, B. ciliatifolia, Helianthemum, several Lechea including L. patula, L. deckertii, L. divaricata,

Hypericum cumulicola, Paronychia chartacea, P. hernarioides, Polygonella basiramea, Pirequeta, Bonamia grandiflora, several Euphorbia, Opuntia, Ruellia, Eryngium cuneifolium, several composites mostly in Solidago, Liatris, Carphephorus, Aster, Heterotheca, Balduina angustifolia. Several species of rare shrubs, including Prunus geniculata, Conradina brevifolia, Calamintha ashei, Polygonella myriophylla, may abound locally, these and several of the herbs being typical of the now endangered flora of scrublands and sharing many of the same ecological quirks. The Clitoria and its associates were probably maintained by a combination of natural woods fires which tended to reduce woody plant competition, together with erosional forces, particularly wind, would tend to create the sandy clearings favored by the Clitoria. Most of the scrub homeland of C. fragrans has been converted either to housing or to commercial property as the south Florida towns expand, or to orange groves. Such plants as this one do not seem to return quickly to abandoned farmland or to neglected orange groves. On the other hand, those areas of scrub that are still relatively intact (and they are few!) are now kept from fire and thus there is a shift in them toward an ever denser woody growth; this means that C. fragrans is losing ground even there! It should be considered endangered rather than threatened.

References

- Fantz, P. R. 1977. A revision of Clitoria (unpublished Ph.D. Thesis, University of Florida, Gainesville).
- Small, J. K. 1926. A new butterfly-pea from Florida (Clitoria fragrans). Torrey 26: 56-57.
- _____. 1933. Manual of the southeastern flora, pp. 721-722. Chapel Hill, N.C.

SPECIES Clitoria fragrans Small. Sweet-scented butterfly-pea

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage			X					X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Clitoria fragrans Small



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FABACEAE

 Lupinus westianus Small. ~~Panhandle lupine; lupine~~

Technical Description

Shrubby evergreen herbs to a meter tall from strong, deep taproot systems.

Stems.--Main stems 1 to few, nearly erect from the root, toward the base sometimes nearly 1 cm thick, terete, stiffish, grayish or brownish with a dense matting of short tomentum, the lower leaves absent by flowering time; secondary branches numerous, alternate, swept upward, slender at first and with the pubescence blonde or tan, sometimes nearly reddish-brown, later the branches becoming stouter, firmer, grayish-tomentose, the whole crown becoming quite full, leafy.

Leaves.--Alternate, simple the stipules very reduced, persisting as low, hairy scales, the petioles prominent, mostly 2-5 cm long, densely short hairy, the blades ascending, mostly obovate or elliptic, 5-10 cm. long, broadly acute or obtuse angled, short-mucronate, entire, quite firm, the upper surface gray green, the lower surface more brownish or orangish green, both surfaces matted with close tomentum.

Inflorescence.--Flowers in conspicuous, dense, slender, elongated racemes from 10 to 30 dm long. on stiffish ascending pedicels to 3 mm. long (elongating somewhat in fruit), these and the calyx densely short-tomentose.

Flowers.--Calyx about 1 cm. long, the tube broadly bellshaped, 2-lobed, the upper lobe very low and broad, the lower lip much longer than the calyx tube, linear-triangular. Corolla about 1 cm. long, the standard slightly longer than the wings and keel, short clawed, the blade broadly ovate or nearly round, emarginate, lingulate (the sides folded upward as in the tongue) a pale bright blue with a broad purplish band within along the middle; wings short-clawed, pale blue, the blades narrowly obovate, falcate; keel petals pale blue, strongly curved upward to narrow, yellowish-orange, firm tips. Stamens 10, all filaments fused from the middle downward, 1 set of 5 longer, with short, round anthers, the shorter set with narrower, longer anthers. Ovary superior, narrow, densely silky hairy, the long style curved upward.

Fruit.--Oblong-elliptic, nearly cylindric, beaked, mostly 2-3 cm long, pale brown with ascending, pale, long, shaggy tomentum.

Distribution and Flowering Season

Sandridges toward and along the coast, northwestern Florida. Flowering in April and May.

Special Identifying Features

This distinctive species is the tallest, most erect in habit of the simple leaved southeastern Lupinus with flowers of the same blue as L. diffusus but having a purple "eye" spot quite unlike the white one of that species. L. villosus, whose range overlaps that of L. westianus also, has petals with more purple rather than bright blue tints.

Habitats and Management Implication

L. westianus is confined to dunal formations near the present coast, is locally abundant in windswept sandy clearings in dunescrub. This scrub is often densely or openly forested with Pinus clausa, this admixed with evergreen scrub oaks, and Ceratiola, Osmanthus, Conradina, Calamintha etc. in the understory. The substrate is always a deep, rather fine sand that at the surface is a glaring white. The habitat is probably maintained naturally for the species by a combination of fire, to reduce woody competition and, wind. Clearcutting of the pine and removal of competing shrubby vegetation would probably increase the species by opening up the habitat, but subsequent establishment of pine plantations would eliminate this shade intolerant plant. Such species should probably be protected in that they tend to help stabilize an otherwise shifting sand. Unrestricted land development along the coast of northwest Florida for various sorts of housing and recreational use is probably the worst hazard to Lupinus westianus.

References

- Small, J. K. 1926. A new lupine from northern Florida. *Torreyana* 26: 91-93.
_____. 1933. *Manual of the southeastern flora*, p. 681. Chapel Hill, N.C.

SPECIES: #131 Lupinus westianus Small, Lupine .

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		X		X			X	
Damage								
No Lasting Effect	NA		NA					
Beneficial if Done Properly					X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Lupinus westianus Small



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FABACEAE

Petalostemon foliosum A. Gray, leafy prairie-clover

[1-3]

Technical Description

A smooth perennial.

Stems.--The slender but firm, rounded stems to 1 m tall, one to several, erect to ascending, simple or branching above from a deep, simple or branched taproot.

Leaves.--Lowest leaves usually absent by flowering time, those toward mid and upper stem rather uniform in size, alternate, numerous, spreading, with slender, sharp-pointed brownish stipules, even-pinnate, oblong in outline, mostly 4-7 cm long and to 2 cm broad, the leaflets mostly 6-15 pairs, elliptic or oblong, 3-10 mm long, mucronate, entire, short-stalked, the surfaces and that of the rachis gland-dotted, the petiole short.

Inflorescence.--Flowers small, mostly about 5 mm long, densely crowded in a cylindrical, terminal spike up to 7 cm long, this on a peduncle usually shorter than the subtending leaf.

Flowers.--Calyx short-tubular, the 5 lobes unequal, narrowly triangular. Corolla of 5, unequal, pale purple petals, these slightly spreading. The stamens are 5, usually with the filaments fused into a thin cylinder above the middle, sometimes with an additional petal-like appendage; the flowers in the mass are quite showy.

Fruit.--Legume short-oblong, concealed in the calyx, few-seeded.

Distribution and Flowering Season

P. foliosum is found discontinuously in limerock districts from Illinois southward to northern Alabama. It blooms from late June through August.

Habitats and Management Implication

This species, now believed to have been destroyed in its Illinois range, is locally abundant in the limestone glades of middle Tennessee. Invariably it avoids the drier areas, but is always in openings of cedar glades which are dry most of the growing season. Thus, one looks for it where there are shallow, moist depressions, these filled with transported clay and providing sufficient soil depth for the extensive taproot; it also grows along shallow streams traversing open glades. As such situations also provide sufficient site for shrubby and arborescent species, and as P. foliosum is a plant of clearings, populations of it give way ultimately in succession to the encroaching hardwoods or to the shade of junipers. The species, apparently never common, was probably maintained in nature through creation of clearings through fire, through blowdowns or diebacks of overstory, or through establishment of comparatively "closed" grass-form communities where sufficient soil could accumulate in depressions in the flat, bedded limestone.

Clearcutting of cedar, which is almost invariably the commonest species of tree in the area, if unaccompanied by radical alteration of the soil, would probably encourage increase of this species, as would selective logging sufficient to create substantial openings. Controlled burning would affect it little and fire may once have been a factor in maintaining "natural" clearings in the area. Site manipulations which reduce soil moisture (such as ditching to speed or improve drainage) would eliminate the species. The species appears to be absent in areas where cattle graze (even where the site once must have been favorable for it). This is a strong indication that it can stand little browse impact.

Selected Readings

Hill, E. J. 1879. The geographic range of Petalosteman foliosus Gray in Illinois. Bot. Gaz. 4:239-240.

Small, J. K. 1933. Manual of the southeastern Flora: 695-697.

Revised March 1980

SPECIES: #35 Petalostemum foliosum A. Gray; leafy prairie-clover

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy		X	X	X				
Damage							X	X
No lasting effect								
Beneficial if done properly	X				X	X		

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Petalostemon foliosum A. Gray



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FABACEAE

100

Petalostemon gattingeri Heller [i-5].

Status: Threatened?

Technical Description:

Perennial from a stout, knotty caudex, this with a deep woody taproot or with several stout-based, elongate, spreading roots, and developing a crown of several woody branches at the groundline.

Stems: mostly spreading, or slightly ascending, simple to copiously branched, the older plants forming a circular mat of many shoots, these slender but stiffish, terete or rib-angled, pale green or sometimes with tints of purple, mostly 2-5 dm long, smooth or with some villous-puberulence distally.

Leaves: alternate, mostly 2-4 cm long, numerous, stipulate, the stipules narrowly triangular or linear-subulate, thin, tan, the petiole (rachis) spreading or ascending, slender, greenish, grooved above, sparsely pilosulous, gland-dotted; leaflets odd-pinnately compound, in (1-) 2-4 pairs, linear, oblong-linear or elliptic-linear, mostly (-.5) 1.0-1.5 (-2.0) cm long, 1-2 (-3) mm wide, apically rounded, acute or retuse, the margin revolute, the base abruptly acute to a petiolule less than 1 mm long, the surfaces pale yellow or gray-green, sparsely pilosulous, the upper side dotted with dark glands, the venation evident only as a single mid-nerve.

Inflorescence: terminal on main axis and branches, densely floriferous, a tight, cylindrical indeterminate spike (2-) 3-6 (-8) cm long, ca. 1 cm thick, the axis villous-tomentulose, the individual flowers subtended by chaffy, tomentose-backed bracts with ovate bodies and exserted, linear-subulate tips (or rarely these bracts replaced by large glistening black glands).

Flowers: perfect, bisexual, irregular, spreading; calyx obovoid to ellipsoidal, 4-5 mm long, the 5 sepals united to form an inequilaterally campanulate tube ca. 2.0-2.5 mm long, the limb slightly bilabiate, the upper lip of 2, triangular-subulate teeth, the lower of 3 narrowly triangular-subulate teeth, all projecting forward and slightly upswept from the oblique orifice, the surface pale green; cloaked with a white to silvery villosulous tomentum; petals mostly 5 (to 2 or 1), strongly clawed, projecting forward, ca. 4.0-4.5 mm long, arising alternately with stamens on stamen tube, a lively bright rose, the standard longest, largest, its blade mostly broadly oblong to ovate or ellipsoidal, symmetrical, the wing and keel blades inequilaterally oblong, slightly shorter and narrower; stamens 5, united, the filaments joined into a ligule, ca. 3.0-3.5 mm long, the free portion pinkish, terete, often flexuous, ca. 3 mm long, exserted beyond the calyx tips, the short-oblong or ellipsoidal anthers dark purple, dorsifixed ca. 1 mm long, the pollen white; ovary superior, sericeous, 1-ovulate, the style produced apically from dorsal side, slender, linear, terete, pinkish, gradually narrowing into a short, whitish, terminal stigma.

Fruit: legume 1-seeded, inequilaterally oblong, ca. 3-4 mm long, the upper side straight and continuous with the persistent style beak, the lower side strongly curved, the body externally scattered with gland dots, toward narrowed base nearly smooth, toward stylar

end white-strigose-tomentose; seed ca. 1.5 mm long, the coat smooth, brown.

Distribution and Flowering Season:

Limestone glades and barrens, middle Tennessee, northwestern Georgia and northern Alabama; flowering from mid-May through June.

Special Identifying Features:

P. gattingeri overlaps in range with but 3 other Petalostemon, namely P. foliosus, P. candidus, and P. purpureus. Of these P. foliosus has many more pairs of leaflets, is a taller, more erect plant, more bluish-tinted in petal color, has a smooth calyx tube and begins to flower when most P. gattingeri is in fruit; P. candidus is a taller plant with broader, smoother leaflets, a smooth calyx tube, and white petals. This leaves P. purpureus, a widespread polymorphic species of prairies and glades north west and south, with which P. gattingeri may hybridize. This species however, while it does have similar flower color, a hairy calyx tube, similar fruit and leaflets, is a taller plant tending to be more erect in habit, thus often not forming the cushionlike mats that are so typical of P. gattingeri. P. purpureus tends to have a more densely floriferous, shorter spike, narrower bract bodies that tend to be more acuminate-tipped than cuspidate (as is the common case with P. gattingeri). Pubescence of calyx is more appressed in P. purpureus than it is in P. gattingeri.

Habitat and Management Implications:

P. gattingeri is one of the more common limestone glade perennials in middle Tennessee and northern Alabama on limestone outcrops. It represents the perennial herbaceous stage of colonization of open glades, its long roots penetrating deeply into cracks in the limestone or into the heavy clay soils derived therefrom. Common herbaceous associates are Sporobolus, Melica, Panicum, Bouteloua, Tridens, Allium, Juncus, Carex, Arenaria, Talinum, Arabis, Leavenworthia, Lesquerella, Sedum pulchellum, Delphinium virescens, Astagalus tennesseensis, Psoralea subacaulis, Onosmodium molle, Lithospermum canescens, Oenothera triloba, Scutellaria parvula, Penstemon tenuiflorus, P. calycosus, and many composites, in total presenting a very showy sight. Over most of the range of this vegetational type, the successional pattern is for occupancy of open glades by shrubs such as Symphoricarpos, Rhus aromatica, Rhamnus, Forestiera, etc., trees such as Juniperus, Ulmus, Celtis, Quercus, Carya, Fraxinus, Diospyros, etc. which ultimately close the open areas and suppress the herbs. Removal of tree cover through fire (the historical process) or cutting would probably tend to favor increase of this species, providing there were contiguous seed sources.

P. gattingeri moves more readily than most other glade endemics; for example, it is coming in strongly along most new highway rights-of-way through limestone barrens, being better adapted than most because of its prostrate-stemmed habit which allows it to escape

most mowing equipment. On the other hand it fares less well if a glade is converted to pasture, in that the plants suffer from grazing and trampling.

References:

Small, J.K. 1933. Manual of the southeastern flora, pp. 695-697.

Wemple, Don K. 1970. Revision of the genus Petalostemon (Leguminosae).
Iowa State Journ. Sci. 45: 1-102.

SPECIES: Petalostemon gattereri Heller

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		NA	NA	NA			NA	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:
Petalostemon gattingeri Heller



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FABACEAE

Psoralea subacaulis T. & G. [5]

Pediometium subacaulis (T. & G.) Rydb.

Status: Threatened?

Technical Description:

Perennial, rosulate, the rosettes terminal to slender, erect or ascending, pale, scaly underground stems, these arising singly or severally from the crown of a deepset, simple or branched carrot or turnip-shaped tuberous rootstock.

Leaves: alternate, of 2 sorts, one scalelike on the underground stem and in the rosette and probably modified stipule, those of the underground stem erect, with strongly clasping base, oblong or triangular, brownish, those in the rosette somewhat larger, paler, broader, usually imbricated, apically acute or bifid, the backs sparsely stigose-hirsute, the margins distally densely and coarsely long-white-ciliate; foliage leaves palmately compound, numerous and in a strong sub-rosette, with petiole bases directly subtended by and hidden within the scale-like stipules, the petiole ascending or spreading, slender, teretish, ribbed, pale green with purple tints, white-hirsute, 6-15 cm long, the leaflets mostly 5-7, spreading on stubby petiolules not longer than 2 mm, mostly oblanceolate, 2.0-3.5 cm long, apically broadly to narrowly rounded or obtuseangled, often mucronulate or apiculate, the margin hirsute or strigo-ciliate, the base narrowly cuneate, the upper surface dark or pale yellow-green, scattered strigose-hirsute, dotted with fine dark glands, the lower surface again gland-dotted, somewhat paler, smooth or scattered-hirsute, the strongly raised midvein hirsute.

Inflorescence: spikelike, erect, terminal, indeterminate, at first compact, 3-4 cm long, 2-3 cm broad, later somewhat interrupted and to 10 cm long, on slender, spreading to erect, terete, white-tomentose-hirsute peduncles about as long as the petioles or slightly longer, the numerous flowers mostly overlapping in several sessile 3-flowered cymules, each cymule subtended by a scarious, scale-like, ovate, purplish, hirsute-ciliate bract 5-10 mm long, the pedicels of a cymule subequal, stoutish, strigo-tomentose, purple, rarely longer than 2 mm.

Flowers: bisexual, zygomorphic, the calyx at anthesis 9-10 mm long, gamosepalous, the tube asymmetrically campanulate, bulging slightly above at base, the orifice oblique, the lobes erect, hirsute-ciliate, the upper 2 lobes and the 2 laterals subequal, triangular, 1.5-2.0 mm long, acute, the sinuses rounded, the lowest lobe largest, elliptic or obovate, ca. 4 mm long, apically obtuseangled or rounded, the surface hirsute, purplish, particularly distally; petals 5, papilionaceous, bright blue-purple, the banner petal 16-20 mm long, with the claw usually ca. 3 mm long, the blade oblong, apically rounded or retuse, strongly folded, projecting forward and slightly upcurved, the wings slightly shorter, similarly projecting forward and slightly upcurvate, the more narrowly oblong blades ca. 9-10 mm long, bearing on the upper side basally a strong auricle, the

keel petals ca. 2 mm shorter than the wings, with claws about 6 mm long and blades asymmetrically oblong, rounded, each with a strong auricle at upper side of base; stamens 10, smooth, diadelphous, ca. 10 mm long, the upper (vexillary) one free, the others united most of the filament length, the anthers yellow, ellipsoidal, basifixed, ca. 0.5 mm long; ovary superior, strigose, the slender style scattered-strigose proximally, distally bent upward near level of anthers, there somewhat thickened, the stigma narrowly capitate.

Fruit: legume ca. 1 cm long, somewhat compressed laterally, elliptical, strongly tapered at both ends, strigose-hirsute with white hairs; seeds usually 1, reniform, somewhat compressed laterally, 4.5-5.0 mm long, smooth, dark brown.

Distribution and Flowering Season:

Open limestone glades, calcareous clay clearings and open rocky woods, local but often aspect dominant, northwestern Georgia (Catoosa Co.) and adjacent Tennessee, mostly in limestone districts of middle Tennessee (the Nashville Basin); northern Alabama; flowering from early April to mid-May, dying back by late June.

Special Identifying Features:

There is no other Scurf-pea within the range of P. subacaulis that remotely looks like this showy plant that actually to the novice botanist appears to be a lupine. Closest to it are "Pediomelium" psoraleas such as P. esculenta Pursh (Bread-root) and P. cuspidata which inhabit calcareous prairies and glades in prairie provinces west of the Mississippi and which have similar turnip-like rootstocks. The former is so similar, being villous-hirsute, with similar habit, flowers and leaves, that it might be considered a vicarious taxon representing western populations of a single species, the now isolated eastern populations radiating to what is now P. subacaulis.

Habitat and Management Implication:

Like so many other endemics of limestone glades in the mid-South, this species should be considered forest related only in the successional sense. Origin of these limestone glades is perhaps still argued, but certainly development and continuance have to do with a combination of shallow parent rock material of flat-bedded or slightly sloping limestone together with fire during dry cycles, this last reducing or halting succession of woody plants. The assemblage of herbaceous associates gives a prairie-like aspect, with the Psoralea often being a dominant and showy feature, interspersed with other endemics such as Petalostemon gattingeri, Onosmodium molle, Viola egglesonii, Lobelia gattingeri, several Leavenworthia, Lesquerella, with other herbs such as Arenaria patula, Sedum pulchellum, Ranunculus fascicularis, R. sardous, Delphinium virescens, numerous carices and grasses, Oenothera triloba, Lithospermum canescens, Scutellaria parvula, Verbena canadensis, Opuntia compressa and Agave virginica are frequent, as are several composites, notably Senecio anonymos, S. obovatus, Coreopsis lanceolata, Crepis pulchra, etc.

The Psoralea develops where the clay has developed to some depth or accumulated as inwash in cracks or depressions in the limestone, and may form patches of thousands of plants. It gives way as woody plants invade and shade it out. Usually this invasion is by Juniperus or the juniper together with other such trees as Quercus muhlenbergii, Q. shumardii, Q. stellata, Q. imbricaria, Carya carolinae-septentrionalis, Ulmus serotina, U. americana, U. rubra, Celtis laevigata, Sassafras, Diospyros, Faxinus americana, F. quadrangulata, and shrubs such as Rhus aromatica, other Rhus, Rhamnus caroliniana, Symphoricarpos, Rubus. In some cases the Juniperus forms solid stands, these later to give way to a hardwood forest climax, but whatever the overstory the story is the same, and the Psoralea disappears as the shade increases. In the pre-Columbian past the story must have been one of old open glades giving way to woody vegetation, which during dyy cycles probably in turn would be opened up by natural fire to create a savanna-like aspect. Fire would also sweep the open glades, thus promoting erosion of the thin, heavy soils and in places expose limestone on which the slow process of succession would begin anew. Today the Psoralea and other limestone glade endemics suffer from urban expansion of cities such as Nashville, Murphreesboro, Lebanon, or from conversion to pasture. A removal of tree cover, providing this is not accompanied by drastic soil disturbance, would tend to provide new area for the Psoralea, as would controlled burning.

References:

- Fernald, M.L. 1950. Gray's manual of botany, ed. 8, pp. 896-898.
Small, J.K. 1913. Flora of the southeastern United States, pp. 620-623.
_____. 1933. Manual of the southeastern flora, pp. 693-694.

***Note. For studies on strategies of Psoralea subacaulis and several other limestone glade endemics one should consult the works of Dr. Elsie Quarterman, Dr. Jerry Baskin, Dr. Carol Caudle where much pertinent ecological information is given.

SPECIES: Psoralea subacaulis T. & G.

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy		NA	NA	NA			NA	
Damage								X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Distribution of:

Psoralea subacaulis T. & G.



245
FABACEAE;Rhynchosia cinerea Nash. Brown-haired snout bean, N.C.N.

Technical Description

Perennial prostrate (non-climbing) vine.

Stems.--Several shoots forming from a woody taproot, these rebranching to form sprawling slender viney shoots from 1 to several meters in length. Stems slender, somewhat rib-angled, greenish-brown, puberulent with downwardly - directed whitish hairs particularly along the ribs, frequently branching toward the main stem base.

Leaves.--Alternate, fairly well separated, spreading, stipulate with stipules erect, early deciduous, narrowly triangular, scaly, puberulent; petioles mostly 1.5-2.0 cm long, puberulent, spreading (sometimes arising in pairs, and opposite, from a short stalk); leaflets mostly 3, ovate to round or broader than long, 1-3 cm long, firm, the terminal one largest, the apex obtuse, rounded, sometimes short-mucronate, the margins entire, somewhat revolute, the bases rounded or low-cordate, the surfaces dark yellow-green, reticulate, the upper surface finely appressed-hairy, the lower surface short hairy mostly on the veins.

Inflorescence.--Flowers 1-7, usually in short racemes on slender, short-hairy, ascending stalks to 10 mm long from axils of most median and upper leaves, and shorter than the subtending leaf.

Flowers.--Calyx about 1 cm long, slightly longer than the corolla, the 5 lineal, puberulent, ascending, tapering-tipped lobes unequal, much longer than the short, campanulate tube. Corolla yellow, the standard short-clawed, nearly round, retuse, slightly arched upward, but folded over the slightly shorter wings and the keel petals. Ovary narrow, densely short-hairy, the style elongate, bent.

Fruit.--Asymmetrically oblong, few-seeded, compressed, 1.5-2.0 cm long, the upper valve edge straight, the lower strongly curved into the acuminate, slender tipped beak; seeds nearly round, flattened, about 3 mm broad, dark brown.

Distribution and Flowering Season

Sandy uplands and pinelands, peninsular Florida southward into the Florida Keys. Flowering from June into autumn.

Special Identifying Features

This plant, while a vine, never twines and thus is not a climber. It is distinguished from other species which are trifoliolate and prostrate-viney, by its cinereous hairs, the more oblong fruit, and the more or less lateral position of the fruit beak. Its nearest relative, R. difformis, a climber, has larger leaflets.

Habitats and Management Implication

R. cinerea is found in a variety of associations. It may be on low sandy rises in flatwoods of slash or longleaf pine with palmetto and gallberry, here on sandy clearings. It may be in sandy fields adjacent to high hammocks of true live oak,

or in clearings in such hammocks. Or it may be in the longleaf pine-turkey oak sandhills, again in clearings. Finally it may be in clearings in sand pine-evergreen scrub on ancient dunes. In any event it is on dryish, at least well-drained sands, and is always either in full sun or light shade. As is true of other leguminous plants of such situations, it increases and maintains through periodic fire. Clearing of forest increases it through reducing shade or producing openings. It is threatened mostly through housing developments, development of orange groves or improved pastures over much of its former range.

References

- Nash, G. V. 1895. Notes on some Florida plants. Bull. Torr. Bot. Club 22: 141-161.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 713-715. Chapel Hill, N.C.
- Walraven, W. C. 1970. A statistical analysis of sixteen taxa of Rhynchosia (Leguminosae) in the United States. Brittonia 22(10): 85-92.
- Vail, Anna M. 1899. Notes on the genus Dolicholus (Rhynchosia) in the U.S. Bull. Torr. Bot. Club 26: 106-117.

SPECIES: #76 *Rhynchosia cinerea* Nash, N.C.N.

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							X	
Damage		X	X	X				X
No Lasting Effect				(NA)				
Beneficial if Done Properly	X							

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Rhynchosia cinerea Nash



Paper 77

Text & map by:

Robert Kral

245
FABACEAE

100
[1-4]

Tephrosia mohrii (Rydb.) Godfrey Pineland hoary-pea,
Hoary peas
Cracca mohrii Rydb.

Technical Description

Perennial herbs from deep branched taproot systems, these producing (usually) several spreading and branched underground shoots from which arise a number of spreading to erect leafy flowering shoots.

Stems.--Flowering shoots slender but stiffish, simple or sparingly branched toward the base, ribbed, at most to 3 dm. mostly 2 dm or less long, greenish or reddish tinted, appressed-hairy with erect, pale shortish hairs.

Leaves.--Alternate, 1-pinnate, spreading or ascending, the appressed hairy, lance-linear stipules 3-5 mm long, early falling; rachis slender, tan, appressed-hairy, the petiole shorter than the longer leaflets; leaflets mostly 15-20 pairs or more, on short stalks (ca. 2 mm), elliptic or oblong, firm, mostly 1-2 cm long, rounded, obtuse, acute or emarginate, usually with a short mucro, the margins entire, the bases acute, the upper surface dark yellow green and veiny, hairy with short, appressed, stiffish hairs, the lower surface paler.

Inflorescence.--Flowers 1-2 axil in congested to somewhat loose, ovoid or short-cylindrical racemes, these leafy-bracted at least toward the bases, exceeded by the leaves, terminal but on slender, ascending appressed-puberulent axes.

Flowers.--Calyx 5-toothed, appressed-pubescent, somewhat bilabiate, ca. 5 mm long, the lobes broadly triangular-based, slenderly acuminate, longer than the tube. Corolla about 1.5-2.0 cm long, showy, the standard petal longest, short-clawed, its blade broadly obovate to suborbicular, somewhat emarginate, pale yellowish-green or cream, the wings short-clawed, oblong, round-tipped, auricled on the upper side, lavender-rose, the keel strongly bowed, yellowish-white with tints of lavender rose. Stamens 10, in 2 lengths, the filaments fused for more than 1/2 the length, the anthers all alike, short.

Fruit.--linear-oblong, strongly flattened, mostly 4-5 cm long, with a narrow beak laterally at the tip and splitting along both edges, the surface appressed-hairy, the seeds numerous, round, somewhat flattened, dark brown.

Distribution and Flowering Season

Longleaf pine-turkey oak sandridges, southern Georgia westward into southern Alabama and southward through northwestern Florida. Flowering from April into early June.

Special Identifying Features

Godfrey (1958) differs considerably from the last revisor of North American Tephrosia, (Wood 1949), in thinking that this is a species distinct from T. virginiana (L.) Pers. It does differ from most T. virginiana in being a shorter plant with shorter leaves, in its inflorescence being exceeded by the bracteal leaves, in its smaller flowers. Whatever T. mohrii really is, it is a rather uniform entity with a fairly continuous range.

Habitats and Management Implication

T. mohrii is confined to the longleaf pine-turkey oak sandhills and flats, usually in some of the driest sites, and often locally abundant. Clear cutting has little effect upon it, unless it would be to increase abundance. It will as readily seed into areas where logging has been followed by bulldozing, raking, etc. as it does into disturbed highway shoulders and rights of way. In nature it probably maintained through being part of fire disclimax in the longleaf pine belt.

References

- Godfrey, R. K. and R. Kral. 1958. Observations on the Florida flora. *Brittonia* 10: 166-177.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 704-708. Chapel Hill, N.C.
- Wood, C. E. 1949. The American barbistyled species of Tephrosia (Leguminosae). *Rhodora* 51 (609, 610, 611, 612.).

SPECIES: #77 Tephrosia mohrii (Rydb.) Godfrey, Hoary peas

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy							eventually X (eventually)	
Damage								X
No Lasting Effect		X	X	X				
Beneficial if Done Properly	X				X	X		

Other Comments: If adjacent seed source

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Tephrosia mohrii (Rydb.) Godfrey



245
FABACEAE :)

Vicia ocalensis Godfrey & Kral ~~Ocala vetch~~

LA

Technical Description

Perennial both sprawling and climbing by tendrils, forming extensive mats of growth.

Stems: The lax stems pale green (save toward the brownish bases), frequently branched, striate-angulate, scattered pilose.

Leaves: Alternate, rather distant, spreading, pinnately compound, the petiole much shorter than the leaflet-bearing part, it and the rachis striate, grooved along upper surface, scattered pilose; stipules lanceolate-curved, strongly few-veined, pilose, about 3 mm. long; leaflets mostly 3 pairs plus the forked tendril pair, linear or narrowly oblong-linear or linear-elliptic, mostly 3-5 cm. long, 3-6 mm. broad, apically rounded and mucronate, marginally entire, slightly narrowed, then abruptly joining the short (about 1 mm.) pilose stalk, the upper surfaces pale glaucous green, the lower surfaces slightly paler and raised-arcuate-pinnate veined, both surfaces nearly smooth or with scattered hairs particularly toward margins.

Inflorescence: Flowers in axillary, upward-arching racemes, these somewhat longer than the subtending leaf, the stalks striate-angulate, sparingly pilose, the racemes at first compact, later elongating. Flower stalks short, spreading 1-2 mm. long, pilose, the flowers tending to be unilateral, somewhat reflexed.

Flowers: Calyx campanulate, about 3 mm. high, irregular, with the base somewhat pouched on upper side and the apex oblique, the teeth shorter than the tube, triangular, the lower 3 longer, more acuminate than the low-triangular upper 2, the surface pale yellow green, pilose. Corolla about 1 cm. long, irregular with the banner petal largest, pale blue or near white basally, the broader and upswept blade deeper but still pale blue, apically notched. Wing and keel petals shorter, narrower, projecting forward, the keel petals arching upward toward the tips at their lower margins, all white save for blue tips of the keel.

Stamens 10, all united to near filament tips. Ovary superior, pubescent, the style bent upward, pubescent just below the stigma.

Fruit: Legume 4.0-4.5 cm. long, 6-8 mm. broad, strongly flattened, oblong-linear with apex and base oblique, the short style persistent as an upcurved beak. Seeds 8-12, rounded and compressed, dark brown, smooth, 2.0-2.5 mm. broad.

Distribution and Flowering Season

Small, marshy clearings along Juniper Creek, Ocala National Forest, Marion County, in northern peninsular Florida. Flowering March into May.

Special Identifying Features

The species is nearest two other vetches, namely V. acutifolia and V. floridana, and is nested well within the ranges of both. However V. ocalensis has longer stems than either, longer leaflets than either, more (12-18) and longer flowers than both, broader and longer legumes and wider seeds than both.

Habitats and Management Implication

This rare species, now eliminated from the site it was first observed through "improvement" for swimmers and fishermen, is known only from scattered localities along one stream which originates as a boiling spring. The substrate is a wet, sunlit, sandy peat. Associate species are mostly grasses (Andropogon, Spartina) and sedges (Dichromena, Rhynchospora, Cladium, Carex, Cyperus) of species normally found along edges of brackish marsh. The stream flows through and over limestones and sands derived therefrom, and is bordered by a fringe of low hammock (Sabal palmetto, Persea, Gordonia, Quercus virginiana, Acer rubrum, Osmanthus, Myrica, Lyonia, Vaccinium, Smilax, Ilicium, etc.) this bounded by higher, drier sites in which the dominants are Sand Pine and various evergreen scrub species. Most of the management of forest in this area involves clear cutting of the predominant Sand Pine, together with wholesale mechanical site preparation of the sandy soils, this generally leaving the lower, low-hammock, species undisturbed. The main threat to Vicia ocalensis would be posed through logging and site preparational disturbance extending too close to the stream and sandy wash down into it from such activity; or through disturbance along the banks by either swimmers, fishermen, or personnel "improving" the banks so as to provide access for boats and people (this is what has destroyed the plants in the type locality). There has been no recent fire or grazing activity in the small area of this species, so that there has been no opportunity to observe this sort of impact.

References:

- Godfrey, R. K. and R. Kral 1958. A new species of Vicia (Leguminosae) in Florida. Rhodora 60 (717): 256-258.

Revised March 1980

SPECIES: #57 Vicia ocalensis Godfrey & Kral; Ocala vetch

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy	X	X	X	X			X	
Damage								
No Lasting Effect								?
Beneficial if Done Properly					X	X		

Other Comments: Exclude streambank disturbance to protect the plant.

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Revised March 1980

Vicia ocalensis Godfrey & Kral



245
LINACEAE!

→ Linum carteri Small var. smallii Rogers [1-3]. Carter's large-flowered flax
Cathartolimum carteri (Small) Small, in part
Linum rigidum Pursh var. rigidum sensu Rogers (1963).

Technical Description

Annual smoothish herb from a taproot.

Stems.-- Erect, stiffish but slender, (1-), 2-4 (-6) dm tall, simple or with simple, spreading-ascending branches from base, proximally purplish-brown and terete, papillose in lines, upwardly greenish with internodes narrowly wing-angled below midribs of the numerous leaves, branching only in inflorescence.

Leaves.-- Linear, linear-ob lanceolate, or elliptic-linear, erect or ascending, spiral and overlapping, small and more spreading toward stem base, largest in lower 1/3 of stem, gradually diminishing into the inflorescence, the largest 1.5-2.5 cm long, acute, entire and somewhat involute, sessile, only the mid-nerve evident, this raised beneath, the surface green.

Inflorescence.-- A cyme, obtriangular in outline, the stiff primary branches usually few, sparingly rebranched, strongly wing-angled, the bracteal leaves and bracts lance-subulate, keeled, marginally glandular-ciliate, the pedicels usually inwardly (upwardly) second, to 1 cm long, usually shorter, wing-angled, axillary, imperceptibly "jointed" 1 mm below calyx.

Flowers.-- Regular, bisexual, opening in morning; sepals 5, distinct. lanceolate, greenish or tinted with maroon, distinct, seemingly in 2 series with the outermost set of 3 longer than the inner 2, deciduous from fruit, all subulate-tipped and glandular-ciliate, triple-nerved with the median nerve raised as a keel; petals 5, distinct, falling by mid-day, golden yellow, spreading, obovate-obtriangular, ca. 15-17 mm long, apically shallowly emarginate, the base broadly cuneate, at very base with a nectariferous "pouch" and there also pilosulous; stamens 5, hypogynous, ascending, the slender white filaments ca. 8-10 mm long, the basifixed, oblong, yellow anthers ca. 1.5 mm long; ovary superior, ovoid, pale green, ca. 3.0-3.5 mm long; style 5-8 mm long, erect, branching just below the 5 yellowish-papillose stigmas.

Fruit.-- An ovoid, greenish-tan capsule ca. 5 mm high, the 5 carpels ultimately separating into 10 1-seeded segments.

Distribution and Flowering Season

- Sandy peat over limestone baserock, moist clearings, cleared areas or pineland savanna, southern peninsular Florida; flowering Feb.-Apr.

Special Identifying Features

This and the var. carteri were at first treated by Dr. Rogers (1963), monographer of the genus, as a part of L. rigidum Pursh whose nearest populations are nearly 1000 miles distant in Texas. Later work (1968) involving cytology as well as morphology confirmed the distinctness of the Florida plants, these

being tetraploid with different corolla pigmentation and different fruit character. There is no problem with identification of L. carteri smallii; it and var. carteri are the only southeastern Linum in which the styles are united to nearly the level of the stigma. L. sulcatum (which occurs no nearer than Georgia) has smaller flowers, styles joined only below the middle, and has persistent sepals. The var. smallii is distinguished from the var. carteri by its smooth stems, taller habit, overall larger flowers (var. carteri has puberulent or scabrid stem angles, shorter habit, smaller flowers). While var. smallii is in the southernmost counties it does extend northward as far as southern Charlotte County; on the other hand var. carteri is confined to the oolites of the Miami area of Dade County.

Habitat and Management Implications

L. carteri smallii grows on sands and sandy peats, usually moist, over a limestone baserock. It is locally abundant on highway shoulders, disturbed areas in the slash pine-saw palmetto type, or where roads and clearings cross cypress. Thus it is on soils which, while moist, are usually not inundated and it would have a preference for disturbance. It is a plant of full sunlight, thus by inference it would increase in areas where trees and brush were removed, decrease where these form a canopy. The pine flatwoods of southern Florida have a history of the Linum. The greatest present threat to this plant is from overdevelopment of much of its former area for the purpose of housing and industrial development.

References

- Rogers, C.M. 1963. Yellow-flowered species of Linum in eastern North America. Brittonia 15 (2): 97-122.
- _____. 1968. A reassessment of Linum rigidum and L. carteri (Linaceae) Florida. Sida 3 (4): 209-210.
- Small, J.K. 1905. Additions to the flora of subtropical Florida. Bull. N.Y. Bot. Gard. 3: 416-440.
- Small, F.K. 1933. Manual of the southeastern flora, pp. 750-752. Chapel Hill, N.C.

SPECIES Linum carteri Small var. smallii Rogers

Carter's large-flowered flax

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage		?	?	?				X
No Lasting Effect								
Beneficial if Done Properly	X				X	X		

Other Comments: **Site drainage is detrimental!**

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Linum carteri Small var. smallii Rogers



245
LINACEAE

→ Linum westii C. M. Rogers, West's flax
[1-2]

Technical Description

Perennial smooth herbs mostly 4-6 dm tall, usually several stems arising from a radiate system of short, thick, horizontal rhizomes.

Stems.--Stiffly erect or ascending from decumbent bases, simple below the inflorescence or branched only toward the base, smooth, toward the base mostly 2-3 mm thick, leafless and brownish, upwardly becoming green, throughout with four low wings on the internodes. Sterile, leafy offshoots sometimes present, these usually leafy to the base.

Leaves.--Mostly opposite, without stipular glands, usually absent from lower part of stem by flowering time, the largest at about midstem, erect, linear, oblong or oblanceolate, mostly 1.5-2.0 cm long, 1.5-3.0 mm wide, blunt to broadly or narrowly acute, entire, the bases short-acute, sessile, in size gradually reduced in length and narrower up the stem and grading into inflorescence bracts.

Inflorescence.--A terminal cyme of many flowers, these on short, ascending stalks mostly along one side of the upwardly arching inflorescence branches (a scorpioid cyme), each stalk 3-4 mm long, subtended by a single short-linear bract, ribbed, and with a faint "joint" about 1 mm below the flower.

Flowers.--Sepals 5, nearly equal, 3-4 mm long, the outer ovate, the inner broadly ovate, obovate or suborbicular, all short-mucronate, the margins thin, fringed with stalked glands (more conspicuously on the inner sepals), ascending, persistent around the fruit, the backs rounded and with a strong midrib, smooth, greenish with maroon tints. Petals 5, distinct, spreading narrowly obovate, bright yellow, unfolding in evening, 6-9 mm long. Stamens 5, the filament bases united; staminodia none. Ovary superior, ovoid, tipped with five slender, distinct styles.

Fruit.--Nearly round, sometimes slightly broader than long, short-beaked, 2.5-3.0 mm long, 2.8-3.0 mm broad, tan, splitting into 10 one-seeded segments (by false septae) which in shape resemble segments of orange, but dry, the septae lacking a marginal fringe. Seeds about 2 mm long, broadly crescent-shaped, laterally flattened and blunt-ended, brown.

Distribution and Flowering Season

Wet areas in pine flatwoods savannas, bogs, shallow ponds, in northern Florida (Baker, Calhoun, Franklin counties). Flowering in July.

Special Identifying Features

This species, in that part of the genus with distinct styles, is nearest L. macrocarpum and L. floridanum. It differs from both in its rhizomatous habit, its mostly opposite (rather than alternate) leaves, its rounder fruit.

Habits and Management Implications

L. westii is locally abundant in pine flatwoods ditches, usually around Hypericum ponds or edges of pitcher plant bogs. The forest type is either longleaf - slash pine-gallberry-saw palmetto or Cliftonia-Cyrilla- (Ti-Ti), or pond pine-pond cypress-Nyssa biflora-Ilex myrtifolia. The plants are usually rooted in muck or sandy peat muck, often in shallow water and in association with Cyperus, Fimbristylis, Dichromena, Rhynchospora, Sagittaria graminea, and a variety of bog grasses. Thus, even during dryer periods, it is on ground that is normally at least moist.

It is a part of a savanna-bog community that thrives in full sun or partial shade and that disappears with drainage or with any mechanical site preparation either through disruption of the bog soil, or through shade of heavy stocking of pines. As is true for most other species in these types, L. westii has been maintained through periodic flatwoods fires. Management of this species requires preservation of some undrained area and undisturbed bog soils.

Suggested Reading

Rogers, C. M. 1963. Yellow flowered species of Linum in eastern North America. Brittonia 15 (2):97-122.

Revised March 1980

SPECIES: #66 Linum westii C. M. Rogers, West's flax

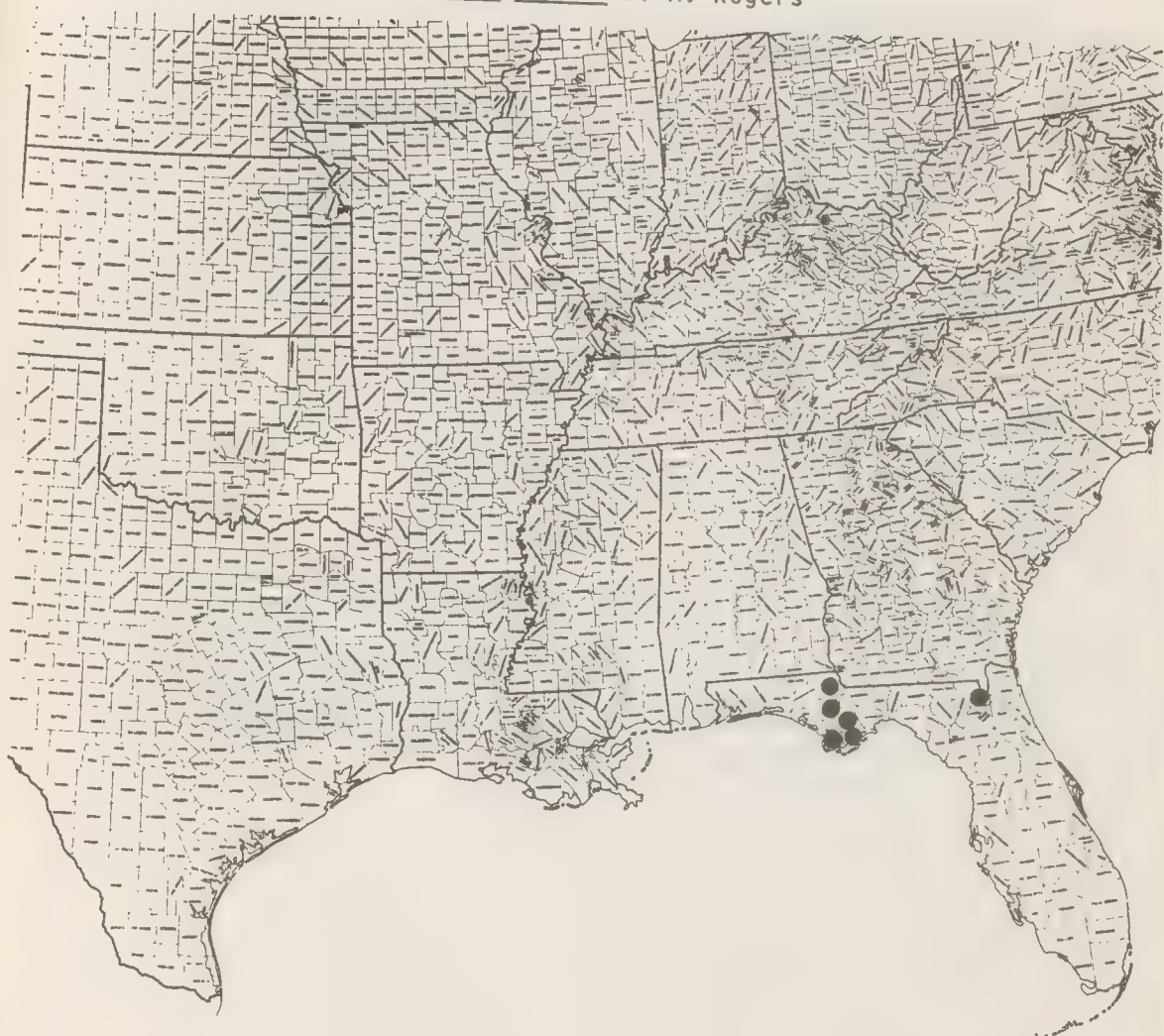
Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy		X		X			X	
Damage			X					
No lasting effect					X	X		
Beneficial if done properly	X							

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Linum westii C. M. Rogers



245
POLYGALACEAE

100
Polygala lewtonii Small, Lewton's milkwort.

Technical Description

Biennial (or short-lived perennial?), smooth, the stems strongly tufted around summit of a stout, deep taproot.

Stems.-- Both sterile and fertile shoots produced, these spreading, ascending or erect, slender but stiffish, usually decumbent-based, angulate, no longer than 2 dm, the primary shoots often rebranched with short, usually erect or ascending branches, the internodes decurrently ridged below the leaves or their scars, thus the internodes narrowly angled, new growth often gland-dotted.

Leaves.-- Simple, usually erect and overlapping in spirals, sessile, yellowish or grayish-green or tinted with maroon, rather succulent, linear, spatulate or oblanceolate, the lowest smallest, those toward midstem largest, mostly 1.0-1.5 cm long, acute, sometimes apiculate, entire, the surface somewhat granular, the venation not evident.

Inflorescence.-- Racemes loosely flowered, oblong-cylindrical, 1-5 cm long, erect, the pedicels spreading or ascending, slender, angulate, gland-dotted, mostly 2.0-2.5 mm long, each subtended by a scarious, whitish, early-deciduous, narrowly triangular bract ca. 1 mm long, the fruit and pedicels dropping soon after maturity; cleistogamous flowers produced on separate shoots at plant base, more scattered in narrower, longer, usually leafless, racemes.

Flowers.-- Two sorts produced, chasmogamous and cleistogamous, the former at tips of elongate, leafy shoots, ca. 5 mm long, irregular, bisexual, the calyx of 5 sepals projecting forward, distinct or nearly so, the 2 lowermost and the 1 uppermost smallest, greenish, scale-like, narrowly ovate, boat-shaped, 2.0-2.5 mm long, the 2 laterals (wings) petaloid, ca. 5 mm long, short-clawed, the blades oblong or lanceolate, bright pink; petals 3, joined at base and also with the fused filaments of the stamens, projecting forward, pinkish, the lowest distally forming a cuplike, fimbriate-tipped keel (the whole structure ca. 3.5 mm long), the ascending stamens enfolded by the cupped sides of its auriculate-lobed base, at base joined to the 2 asymmetrically oblong lateral petal lobes; stamens 8, not evidently diadelphous, the filaments basally joined, the free whitish filament tips upwardly bent, terminating in short yellowish, cylindric-oblique, 2-locular, poricidal anthers; ovary superior, bilocular, with 1 ovule/locule, the style terminal, bent as in *Viola*, its truncate stigmatose tip forming a cup.

Fruit.-- Capsule short-cylindrical, somewhat angulate, also bilobed, ca. 5 mm long, the seeds cylindric, ca. 3 mm long, strongly carunculate.

Distribution and Flowering Season

Deep sands of clearings in sandscrub and sandy high savanna, lakes region of peninsular Florida; flowering from February and March intermittently through summer.

Special Identifying Features

This species is closest to P. polygama, which is widespread on a variety of soils through the eastern U.S. However, it has a much larger root, tends to form larger clumps, the leaves tend to be narrower, the wing sepals more rhombic (inequilateral rather than obovate, and are shorter than the capsule (rather than equal to it or longer) which is of a narrower outline.

Habitat and Management Implications

P. lewtonii is extremely local in the Florida sandhills in the highlands of the peninsula and is mostly to be found in the Sand pine-evergreen scrub oak type or in high sandy lakeside savannas which are dotted with longleaf pine and low scrub oaks. The sites are usually quite dry, the vegetation sparse. Occasionally the species comes in on powerline clearings or along new roads. It is threatened most by the construction of large housing developments or wholesale clearing for orange groves. Cutting of pine and removal of competing oak scrub would tend to favor this species. Its reaction to fire has not been observed, but it is part of a type in which fire has had an historic role.

References

- Small, J.K. 1898. Studies in the botany of the southern United States, p. 140. Bull. Torr. Bot. Club 25: 140.
- _____. 1933. Manual of the southeastern flora, pp. 768-773. Chapel Hill, N.C.

SPECIES Polygala lewtonii Small. Lewton's milkwort

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage		X	X	X				
No Lasting Effect								
Beneficial if Done Properly	?				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Polygala lewtonii Small



245
EUPHORBIACEAE→ Croton alabamensis E. A. Smith, Alabama croton

[1-3]

Technical Description

Broad-crowned shrub 2-3 m tall with overwintering leaves.

Stems.--Bark of older wood thin, gray-brown, cracking irregularly, the main stem with an irregularly forking branch habit (usually branching at base of old inflorescences), the branches slender but stiffish, spreading, leafy only toward their tips. New shoot growth whitened by a dense coat of thin, silvery scales, terete.

Leaves.--Spirally arranged, spreading on slender, stiff, densely silvery-scaley petioles 0.5-2.0 cm long, the blades narrowly ovate, elliptic or oblong, 5-10 cm long; the tips rounded-emarginate, the margins entire, the bases acute, the upper surface dark yellow-green, smooth or sometimes with a scattering of pale scales, impressed-pinnate-veiny, the lower surface densely silvery-scaley, with main veins strongly raised.

Inflorescence.--Flowers unisexual on the same plant, in terminal racemes of one sex or with male above female, the racemes erect, slender but stiffish, silvery-scaley, mostly 5 cm long or less, the flower stalks spreading or ascending, in flower mostly 5 mm or less long, somewhat lengthening with age.

Flowers.--Symmetrical: male flowers broadly cupshaped or rotate, ca. 5 mm across; calyx lobes 5, spreading-ascending, narrowly triangular, 2.5-3.0 mm long, greenish with silvery scales; petals oblong, pale green, about 2.5 mm long, ciliate, the backs scaly; stamens 10-25, arising from the inside of a low, lobed, orangish, pilose disc, spreading or ascending on slender, hairy-based filaments to 4 mm long, the anthers about 1 mm long, the two sacs convergent. Female flowers campanulate, about 4 mm high, the petals and sepals of similar shape to the male, but more erect, the superior, ovoid, scaly ovary ringed at base with an orangish, lobed disc and tipped by 3 style branches, these troughed internally toward the summit.

Fruit.--Capsules erect on ascending pedicels, these lengthening to between 1.5 and 2.0 cm, capsule body subglobose, strongly 3-lobed, pale green with a coating of silvery scales. Seeds 1/locule broadly ovoid, ca. 7 mm long, the backs rounded, the inner 2 faces converging in a broad angle, the surfaces reddish-brown with irregular streaks and mottlings of white.

Distribution and Flowering Season

Calcareous rocky bluffs, rocky, wooded, ravine slopes and terraces, Cahaba and Warrior River systems of middle Alabama near contact of Appalachian and Coastal Plain provinces. Flowering mostly from February into April.

Special Identifying Features

The only Croton in the southeastern United States combining a shrubby habit with a complete perianth.

Habitats and Management Implication

The authentically known populations of this species are in but two counties of Alabama. The individual populations consist of from but a few plants to very many covering several acres. The shrubs are usually either on hard limestones or dolomitic limestones or calcareous shales and may be found either in full sun or as understory to oak-hickory-ash-hard maple-juniper. The soils are thin, heavy, probably basic in reaction. The geology of this same area is complex, the sedimentary rocks striking the drainages along which the Croton grows ranging from basic to quite acidic, so that a wide variety of forest types are found nearby, including some fine sites for both mixed hardwoods and pine. The steep topography would favor some caution in logging; the soil also is too rocky for most methods of site preparation. The thin-barked and shallow-rooted character of the Croton shrubs would be an indication that they would not survive fire of any intensity. No records are available of its being used by livestock; indeed many Croton are considered toxic to livestock.

Selected Readings

- Harper, Roland. 1928. Economic botany of Alabama, catalogue of the trees, shrubs and vines, etc. Geologic Survey of Alabama, Monograph 9 (2): 229.
- Mohr, Charles. 1889. New or little known shrubs of eastern North America. Garden and Forest 2:592.
- Small, J. K. 1933. Manual of the southeastern flora, pp. 780-783.

Revised March 1980

SPECIES: #53 Croton alabamensis E. A. Smith, Alabama croton

Expected effect on the species*	Management Practices							
	Prescribe burn	Bulldoze or root rake	Bed	Chop	Thin over-story	Cut over-story	Establish plantation	Graze
Destroy								
Damage								
No lasting effect	NA					NA	NA	X
Beneficial if done properly					X			

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are rough in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Other Comments.—

Revised March 1980

Croton alabamensis E.A. Smith



245
EUPHORBIACEAE!

100
Croton elliottii Chapm. Elliott's croton

Technical Description

Taprooted, stellate-pubescent, annual herb.

Stems.-- Main stem erect, (1-) 2-6 (-10) dm high, mostly simple, branching only in the inflorescence or sometimes (when luxurious on sites good for it) bushy-branched from near the base, terete, greenish or yellowish-green, the color determined by the trichomes which range from white to blondish or brown; branches upwardly arching, several main ones usually arising at inflorescence base and giving a "whorled" appearance, these usually elongate and toward tips again rebranching in pseudo-whorls, the branches toward their tips increasingly tomentose.

Leaves.-- Basal usually absent by flowering time, usually those toward base of primary branches largest, there "pseudowhorled" on elongated portions of stem and branches rather distant, spreading or ascending, the blades mostly narrowly lanceolate, linear-elliptic, or narrowly oblong, (2-) 3-6 (-8) cm long, firm, acute, entire, the bases rounded to broadly cuneate, only the midrib prominent, the upper surface yellow-green, stellate-puberulent, the lower surface paler, silvered or blondish with stellate tomentum; petioles slender, terete, ca. 1/3-1/2 as long as the blades, stellate-pubescent.

Inflorescence.-- Flowers in nearly sessile to short-pedunculate, compact, erect, indeterminate, spikelike racemes, the female fewer and basal, the more numerous males abscising as the inflorescence elongates, each floret subtended by a tomentose, narrowly linear bractlet slightly longer than the pedicel.

Flowers.-- Regular or nearly so; male globose, ca. 2 mm broad, on stiffish, spreading-ascending pedicels ca. 1 mm long, the sepals (usually) 5, distinct, ovate, strongly arched inward and cupped, 1.5-2.0 mm long, blunt, the backs stellate-pubescent, the petals narrower, distinct, mostly oblong, scarious (very thin), flatter, ascending, alternating with small fleshy glands, the stamens mostly 10-12, erect or incurved, the short (ca. 0.5 mm), slightly divergent anther sacs basifixed, on pale, villous-based filaments ca. 1.5 mm long; female flowers at anthesis nearly 2 x as long as the male, slightly irregular, the 6-8 sepals joined at base into a shallow cup, mostly obovate or oblong-spatulate, fleshy, backs tomentose, apex fleshy, dilated, cup-like, strongly incurved, the ovary sessile, obovoid-globose, densely pale-tomentose, the short style spreading-branching into short-linear segments, these again forking, then reforking to form a total of 12 linear stigma lobes.

Fruit.-- Ripe capsule obovoid-globose, greenish, stellate-hairy, ca. 5 mm long, clasped by the slightly enlarged sepals, 3-loculed, 3-valved, 3-seeded, the seeds ca. 4 mm long, in outline broadly ellipsoidal, the backs rounded, smoothish (minutely cancellate), dark gray, lustrous, the inner faces flattish, forming a broad angle, bearing at very base below the attachment scar a yellowish, fleshy, transverse, ellipsoidal caruncle.

Distribution and Flowering Time

Moist to rather dry sands or sandy peats of fields, flatwoods, roadsides and

pondshroes in the Coastal Plain, eastern South Carolina, (according to Small, 1933), southwestern Georgia, and southern Alabama; flowering from July into September.

Special Identifying Features

Of the entire-leaved species occurring within the range of C. elliotii, and possibly in its habitat, there are but three, namely C. capitatus, C. engelmannii, and C. monanthogynus. The first is a larger plant throughout, with broader leaves, flatter female sepals, and a darker pubescence. The second, in addition to having flatter sepals, has shorter petioles and broader leaves. The third has smaller leaves, broader leaf outlines, is branched near the ground, has smaller male flowers which nod on the pedicels, and a different fruit and seed.

Habitat and Management Implications

C. elliotii frequents moist to dryish sands, sandy peats and peats. It is commonest on the drying shores of permanent to temporary ponds, lakes, and pools in karst topography. It is intolerant of shade. Considered rare and endangered, this species has not shown up much (if at all) in collections since the early 1940's. However, during the 1977 season it has been found to be abundant around nearly every limesink pond in southwestern Georgia, adjacent northwestern Florida, and in southeastern Alabama. Where found it forms nearly pure stands, and is also often locally abundant in those crop fields and pine plantations adjacent to the ponds, and is not infrequent along roadside ditches in these same areas. Thus it would seem that the rarity of this species is only during those long periods in which the complex of requirements for germination of its abundant seed are not met. 1977 was a drought year, exposing large areas in which normally would be underwater or wet, and it is evident that the seed of C. elliotii lie dormant during wet periods. Hardly any other story explains the sudden occurrence of these large stands of the Croton. Mechanical disturbance of the soils in which its seeds lie dormant also appears to promote its increase, the most luxuriant plants being found in places where spoil banks have been created or where pond edges have been plowed.

References

- Chapman, A.W. 1860. Flora of the southern states, p. 430. Cambridge.
Small, J.K. 1933. Manual of the southeastern flora, pp. 780-783. Chapel Hill, N.C.

SPECIES Croton elliotii Chapm. Elliott's croton

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	NA
Damage No Lasting Effect	X	*	*	*				
Beneficial if Done Properly								

Other Comments: *dependent on time of year!

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Croton elliottii Chapm.



245
EUPHORBIACEAE

Euphorbia discoidalis Chapman E-G.

E. curtisii Engelm. in part

Tithymalopsis discoidalis (Chapm.) Small

T. apocynifolia Small, in part

Status: Threatened?

Technical Description:

Perennial, milky-juiced, from an elongate simple or branched, deepset, fleshy rootstock, the lower part of the stems and lower branches often deeply buried.

Stems: erect or ascending, arising from below the ground line so that a single plant may look like a clump, above the ground line reaching mostly 3-7 dm high, simple toward base or branching throughout, with branches at each level successively shorter, ultimately very short, this producing a profusely forking-branched crown of scattered involucre; axis near the ground terete, developing a thin, dull-brown, anastomosing bark with narrowly diamond-shaped or linear cracks, upwardly terete with several low, rounded ribs, greenish or sometimes tinged with red, smooth or with a scattering of soft, pale hairs, particularly on nodes and ultimate branchlets.

Leaves: mostly alternate on lower main axis, becoming whorled at the first branch node, opposite along most of the primary and secondary branches, sessile or petiolate, minutely hairy-stipulate, those of the main stem often lost by flowering time; blades ascending to reflexed, ranging from filiform through linear to narrowly oblong, elliptic, ovate or even oblanceolate or obovate, 2-5 cm long, apically narrowly to broadly rounded, the margin entire, strongly revolute, the base rounded to acute or cuneate, the petiole 3 mm long or less or absent, if present pilose or hirsute, the upper blade surface yellow-green, impressed veiny, rarely with a scattering of hairs, the lower surface paler, smooth or densely to slightly pilose, in narrower leaves with only the raised midrib evident, in broader leaves with pinnate-laterals also raised; leaves of inflorescence often abruptly smaller above the lowest pair or whorl, usually present as pairs or in whorls of 3 at levels of branching, commonly linear or oblong, less often elliptic or broader, usually spreading, smooth or pubescent, as in lower leaves.

Inflorescence: a dichotomously forking compound of cymes bearing cupuliform glands in the branch axils, the branches slender, smooth or pilose; involucre (cyathia) small, campanulate, mostly 1.0-1.5 mm high from base to rim of cup, pale green, pale red or yellow-green, appressed-white-hairy, the 5 reniform glands at margin of cup with broadly obovate, reniform or rectangular or squarish, white, pink, or yellowish-white petaloid appendages, these mostly 1.5-2.0 mm long, spreading, broadly rounded, entire or wavy-margined.

Flowers: as in Euphorbia, namely with several single-stamened male florets and 1 female floret/cyathium, the androphore and filament of a stamen projecting the anthers to about the mouth of the cyanthium, the female stalk projecting the strongly 3-lobed ovary slightly beyond the cyathial rim at anthesis, still further as the fruit forms, the

ovary body subglobose, strongly 3-lobed, the style 3-branched, with each branch rebranched into short-linear excurved stigmas. Fruit: Capsule globose or depressed globose, strongly 3-lobed, mostly 2.5-3.0 mm high, the fruit stalk 3-5 mm long; capsule valves yellowish-green, rarely reddish-green at maturity, externally smooth; seed nearly round to broadly obovoid or ellipsoidal, pale gray, smooth, with minute rows of shallow pits, ca. 2 mm long, the rounded backs with a low medial ridge, the inner side with the raphe forming a longitudinal low groove.

Distribution and Flowering Season:

Open sandy woodlands, sandy clearings, sandhills, Coastal Plain, southwestern Georgia, northern Florida, southern Alabama; flowering from late August to frost.

Special Identifying Features:

This species was thought by its original author to be confined to the pinelands of northwestern Florida, and the earlier descriptions of it call for a narrow-leaved plant. Dr. Michael J. Huft, current monographer of this part of Euphorbia (Tithymalopsis, Agaloma) has seemingly much broadened the concept of the species so as to include several other "taxa" (including E. curtisii Engelm. in part) that have smallish cyathia but proportionately larger petaloid appendages and a common seed character. If this broadened description is accurate, E. discoidalis then ceases to be the rare narrow-leaved entity of the Florida pinelands and becomes a rather weedy plant that is frequent in much of southern Alabama and Georgia as well as Florida. It, in this broadened sense, is distinguishable from others of the complex by a combination of profuse branching, comparatively low level of red pigmentation of cyathia, hairy nodes, petioles and cyathia, and relatively short-peduncled cymules, the short, ultimate brachlets terminating in but a single cyathium.

Habitat and Management Implications:

E. discoidalis is ecologically more ample than is the definitely more rare E. exserta. It is commonest in the Longleaf Pine-deciduous scrub oak type but may be encountered also in oak-hickory-yellow pine uplands, wherever the soils are sandy. Some common associates are Aristida (particularly A. stricta), Andropogon (ternarius, virginicus, gyrans), Gymnopogon ambiguus, Tridens, Triplasis, Sorghastrum secundum, Paspalum, many dichanthelium, Panicum, Erianthus, Cyperus filiculmis, C. retrorsus, C. plukenetii, Rhynchospora grayii, Bulbostylis ciliatifolia, Tradescantia, Commelina erecta, other euphorbiaceous plants such as Tragia, Acalypha, Crotonopsis, Cnidoscolus, many legumes including many Lespedeza and Desmodium, Galactia, Crotalaria, Petalostemon carolinianum, Astragalus, Lupinus (particularly L. nuttallii, L. villosus), Tephrosia, and many composites including species of Eupatorium, Liatris (L. tenuifolia, L. gracilis, L. elegans), Helianthus, Heterotheca, Verbesina aristata, Vernonia angustifolia, Aster (particularly A. adnatus, A. concolor, A. patens, A. dumosus), and Silphium.

This plant appears to have increased as a result of disturbance. Areas in various stages of site preparation have an abundance which continues until the crowns of plantation pine close. In naturally stocked uplands it increases as a result of woods fires which

reduce competing woody vegetation.

References:

Chapman, A.W. 1897. Flora of the southern United States, ed. 3,
pp. 422-426.

Small, J.K. 1933. Manual of the southeastern flora, pp. 798-800.

SPECIES: Euphorbia discoidalis Chapman

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy							X	
Damage								
No Lasting Effect		X	X	X				
Beneficial if Done Properly	X				X	X		X
Other Comments:								

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Approximate Range of:
Euphorbia discoidalis Chapman



EUPHORBIACEAE

Euphorbia exserta (Small) Coker [?]*?Tithymalopsis gracilis* (Bl.) Small*T. exserta* Small*E. gracilior* Cronq.

Status: Threatened

Technical Description:

Milky-juiced, smooth, slender-and-divaricately-branched perennial from a deep-set, fleshy, simple or branched, vertically oriented rootstock, the stems usually several, arising at or well below the groundline from alternate or clustered buds.

Stems: arising from or well below the ground line, mostly 3-5 dm high, underground portions slender, much branched, the leaves short, scale-like; aerial branches several to many (imparting a tufted look, the primary branches often resembling individual plants), erect or ascending, repeatedly branching, usually forking either from near the ground line up, or well above the ground line, bearing a broad, low, split gland in the crotches, slender, terete, smooth, pale to deep green, usually strongly tinged with maroon, the ultimate branches becoming nearly filiform, forming a round, delicately branched crown.

Leaves: sometimes alternate, usually opposite, the lower ones often absent by anthesis, but when present highly variable in outline, in the axil either bearing a cleft gland or a branch, the stipules reduced to minute, reddish glands, the petiole short (under 3 mm) or absent, the larger blades lowest, from filiform (rarely) to linear, oblanceolate, spatulate, obovate, suborbicular or even reniform, 1.5-5.0 cm long, apically narrowly to broadly rounded, the margin thickened, entire, usually reddish, the base acute to short-attenuate or rounded or truncate, the surface gray-green or tinged with maroon. Leaf blades progressively reduced in size, narrowing up the stem, those of a pair sessile, often unequal, ultimately those of upper branches short-linear, 5 mm or less long, or in some cases simply narrower in outline and not much reduced in length.

Inflorescence: much branched, the numerous peduncles arising at branchlet tips or from branch axils, filiform, often maroon, mostly several to many times longer than the involucre (cyathia). Cyathia campanulate, ca. 2.5 mm high, deep maroon, bearing at the margin of the cup 5, losenge-shaped glands, each gland marginally producing a narrow, broadly rounded or truncated petaloid appendage.

Flowers: unisexual, each cyathium producing several male florets each having but 1 stamen and a single female floret, the perianth in either case vestigial, in the male each filament jointed to a stalk, the ripe round anther sacs elevated to or slightly above the cyathial rim, the female floret similarly raised on a stalk (gynophore) to slightly above the rim and evident only as a 3-lobed, rounded, maroon ovary, this with 3 short styles, each rebranched to form short-linear stigma branches.

Fruit: Capsule at maturity strongly exerted beyond the rim of the cyathium on a filiform stalk (lengthened pedicel and gynophore) several times the height of the cyathium, nearly round in outline and strongly 3-lobed, about 3 mm high, 3-loculed, 3-valved, smooth, usually reddish, producing 1 seed/locule; seeds ca. 2 mm long, broadly obovoid, the small caruncle on the inside base, the broadly rounded back with a low, longitudinal ridge, the seed faces smooth, sometimes with a few low concavities, grayish or pale grayish-brown.

Distribution and Flowering Season:

Sandhills in Longleaf pineland, Coastal Plain, eastern North Carolina southward to northern Florida, westward to southwest Georgia and northwest Florida; flowering from May to early August.

Special Identifying Features:

This species is well marked by a combination of slender, though stiffish, divaricately branching habit, its strong reddish pigmentation of cyathial cups, fruit, even peduncles and branches, the short-petioled or sessile variable leaf blades, these often maroon-margined. The capsule is smaller, the seed smaller than those of E. ipepacuanhae, which has larger cyathia and whose stems and branches, while slender, are not as delicate.

Habitat and Management Implication:

E. exserta is a plant of deep dryish sands and appears to be an integral part, if infrequent, of the Longleaf Pine-deciduous scrub oak sandhills. The most constant overstory species then are Longleaf Pine, Quercus laevis, Q. margaretta, Q. incana, Q. marilandica, Q. stellata, Q. geminata (to the south in the range), Carya glabra, C. tomentosa, C. pallida. Understory trees and shrubs may be Cornus florida, Diospyros, Sassafras, many ericads, particularly Vaccinium, Gaylussacia, Lyonia mariana, etc. To the south in the range Osmanthus, Symplocos, Ceratiola, various shrubby Calamintha, Conradina may enter this type, as does Saw Palmetto. Herbaceous associates include several Aristida, Sporobolus, Andropogon, Triplasis, Cenchrus, Eragrostis, dichanthelium Panicum, Cyperus (particularly C. retrorsus, C. filiculmis), Rhynchospora such as R. grayi, R. megalocarpa, Bulbostylis, Paronychia, Lechea, various legumes such as Lespedeza, Desmodium, Stylosanthes, Psoralea canescens, Cassia, Indigofera, Lupinus, Petalostemon carolinianum, Warea, Opuntia, Dicerandra, many Asclepias, and an abundance of composites, all species typical of deep sand formations, many cormophytes and all adapted to frequent natural woods fires which reduce woody competition and often present a landscape that has large open stretches of loose sand. In fact, the way to perpetuate a species such as E. exserta is to apply fire as a management tool as has been done in this forest type. The problem becomes more difficult when any mechanical site preparatory work is done. This species, as do many other such herbs, readily occupies disturbed open sandy areas and may thrive during the earlier years of the plantation. However, it disappears as soon as the crowns close, reappearing only years later as, through thinnings,

the stand reopens.

References:

- Coker, W.C. 1912. Euphorbia exserta in Plant life of Hartsville: 88.
- Cronquist, Arthur. 1949. Euphorbia gracilior in Castanea 14: 102.
- Radford, A.E., H.E. Ahles & C. Ritchie Bell. 1968. Manual of the vascular flora of the Carolinas, pp. 668-674.
- Small, J.K. 1933. Manual of the southeastern flora, pp. 788-800.

SPECIES: Euphorbia exserta (Small) Coker

Expected* Effect on Habitat	Prescribe Burn	Doze or Root Rake	Bed	Chop	Thin Over- story	Cut Over- Story	Over Plant with trees	Graze
Destroy							X	
Damage			NA					
No Lasting Effect		X		X				X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Estimated effect is an estimate of the author based on his book knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may vary in degree of application, intensity, nearness to plant communities, etc. A column left "blank" indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, predictions should be refined by area and by intensity of forestry practices.

Euphorbia exserta (Small) Coker



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EUPHORBIACEAE

Euphorbia telephoides Chapm. Spurge
Galarhoeus telephoides (Chapm.) Small

Technical Description

Perennial smooth, milky-juiced herb from a thickened, deep-set woody rootstock.

Stems.--Stems arising usually well below-ground, solitary or several, close-set toward apex of thickened crown, erect or ascending, at most to 3 dm high, terete, sometimes branching at base, otherwise simple except in the inflorescence, the above ground parts often tinged with red, distally green, there with decurrent ribs from leaf midrib bases.

Leaves.--Numerous, alternate-spiral, on main axis, opposite in inflorescence, the lower ones triangular, scale-like, the largest at midstem or directly beneath inflorescence branches, broadly obovate to suborbicular, broadly spatulate, elliptic or oblanceolate, mostly 3-6 cm long, rounded to broadly acute or obtuse-angled, entire, the base cuneate or short-attenuate, sessile or nearly so, or in uppermost leaves and bracts clasping and with blades narrowly ovate or triangular; leaf surfaces deep to pale yellow-green or suffused with maroon, the midrib and margins usually maroon.

Inflorescence.--Broader than long, a compound of leafy-bracted cymes of cyathia (the cyathium is a cup-shaped involucre bearing inside, usually, few to several male flowers comprised mainly of stamen and one stalked female flower which at maturity projects, and bearing around its margin appendaged or unappendaged, often petal-like, glands; in this complex of species the glands are unappendaged), these in bloom top-shaped, maroon, 2.5-3.0 mm long, bearing on their rim 4, short-stalked, half-round, fleshy, greenish-maroon glands alternating with 4 erect, red, roundish to obtuse-angled, scale-like ciliate-fimbriate appendages nearly as high as the glands, the whole cyathium on a slender maroon stalk mostly 3-10 mm long and frequently concealed by the leafy subtending bracts.

Fruit.--Capsules in outline reniform, ca. 6-8 mm broad and 5 mm high, strongly 3-lobed, each lobe keeled, the keel edge maroon, the surfaces otherwise dull green, minutely pebbled. Seeds 1/locule, nearly round, ca. 3 mm across, gray or gray-brown, smooth to minutely pebbled.

Distribution and Flowering Season

Sandy longleaf pineland, low sandy ridges, mostly near the coast, northwestern Florida; flowering mostly from April into July, but if disturbed blooming throughout the growing season.

Special Identifying Features

This species is nearest E. inundata Torr. a taller plant of moister habitats, usually moist to wet pine flatwoods savannas and hypericum pond borders from northwestern Florida to southern Alabama. E. inundata is normally bushier, with leaves ranging narrower; its inflorescence is more diffuse, the cyathia more numerous on longer stalks; the cyathial glands are fleshy and obliquely truncated, entire or nearly so as in E. telephoides, but the scale-like

cyathial appendages tend to be lacerate-fimbriate and with mucronate apices.

Habitat and Management Implications

E. telephoides is mostly either in wire-grass dominated longleaf pine-slash pine savanna or on the low sandy rises contiguous, these usually dominated by turkey oak and other scrub oaks interspersed with pine. In either case the deep woody rootstock extends down into a dark moist sand. Serenoa is abundant throughout, as are Conradina, Hypericum, Yucca. Grasses in Panicum, Aristida, Sporobolus, Muhlenbergia, Anthenantia, Sorghastrum dominate, interspersed with Xyris caroliniana, many Polygala, Rhexia alifanus, and an abundance of composites in genera Chrysopsis, Aster, Solidago, Liatris. Phoebanthus tenuifolius is an almost constant associate.

Natural woods fires probably maintained this species historically, in that burning reduces woody competition and increases the wire-grass area. Most herbarium specimens of E. telephoides show some evidence of fire disturbance. Many cormophytes such as this one respond vigorously after a burn; certainly controlled burning would tend to increase abundance. Neither are most mechanical site preparatory techniques fatal, in that a number of the deep rootstocks survive to produce vigorous shoots. However, the purpose of such preparation is to develop plantations of slash pine, and as soon as the crowns of the young pines close E. telephoides is shaded out.

Reference

Small, J. K. 1933. Manual of the southeastern flora, pp. 800-801. Chapel Hill, N. C.

SPECIES Euphorbia telephoides Chapm. Spurge

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut over- story	Establish Plantation	Graze
Destroy							X	
Damage No Lasting Effect		X	X	X				X
Beneficial if Done Properly	X				X	X		

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Euphorbia telephoides Chapm.



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EUPHORBIACEAE

Phyllanthus liebmannianus Muell. Arg. ssp. platylepis
 (Small) Webster Florida leaf-flower; leaf-flower
~~Phyllanthus platylepis Small~~

Technical Description [1-3]

Glabrous perennial herb, the rootstock blackish, slender, woody, horizontal or with ascending or erect branches from which come one or more slender, erect leafy shoots.

Stems.--Slender, to 3 dm long, terete, greenish or greenish-brown, simple or sparingly branched.

Leaves.--Numerous, spirally arranged, stipulate, the stipules triangular-ovate, reddish-brown, small; leaf blades narrowly obovate, obovate, or oblanceolate, 1-2 cm long, the apices rounded or obtuse, apiculate (with a small tooth or apiculus), the margins entire, slightly revolute, the base cuneate, sessile or short-petiolate, the upper surface darker green, the lower surface faintly reticulate with a raised midnerve.

Inflorescence.--The species monoecious with male and female flowers mixed in small umbel-like clusters at some upper nodes, single at others; flower stalks 2-3 mm. long in flower, slender, spreading, the female one elongating to 5 mm or more in fruit.

Flowers.--Staminate flowers with sepals 6, distinct, obovate or spatulate, rounded or obtuse, mostly entire, pale greenish-yellow, about 1-2 mm long; stamens 3, filaments 0.6-1.0 mm long, joined into a column by filaments at base; anthers about 0.4 mm long. Female flowers with calyx lobes 6, suborbicular or rhombic, acute, greenish, in fruit up to 2.8-3.5 mm long.

Fruit.--Capsules depressed-globose, about 4 mm broad. Seeds usually 3, ovoid, dark brown, minutely and irregularly ridged (verrucose).

Distribution and Flowering Season

Hardwood-palm hammocks, flatwoods, Gulf Hammock region on northwestern peninsular Florida. Flowering all year, but most heavily in springtime.

Special Identifying Features

This is the only species of Phyllanthus in the southeast that has a female calyx that becomes foliaceous in the fruit and which even in bloom is larger than that of the male flower. Its nearest relative, P. liebmannianus ssp. liebmannianus, is across the Gulf of Mexico in the Mexican Coastal Plain and in British Honduras.

Habitats and Management Implications

The species is one of high hydroperiod, fine textured, highly drained, sometimes alluvial soils derived from massive limestones of Tampa Formation. A typical habitat would be low hammock, forested by a mixture of tupelo, sweet-gum, popash, cabbage palm, palmetto, magnolia where it forms clones of considerable

size in moderate to dense shade. Such forests are still extensive in the Gulf Hammock region on northwestern peninsular Florida from southern Taylor County south into Levy County. P. liebmannianus is also found in forest which has an admixture of slash pine-galberry-saw palmetto. Plants will persist in hammocks which have undergone either heavy logging or grazing, and are sometimes found in full sunlight; however, it is not known how long they will remain in such sites. It has been observed in low limerocky pasture along the highway east of Cedar Key, but is more abundant in contiguous areas of unlogged, ungrazed woodland. Fire is a rare factor in these low hammock areas so that there is no information on the response of this species to fire. A McDaniel specimen (S. McDaniel 4778) collected from 3 m. n.w. Steinhatchie in July 1964 is from a recently bulldozed area and from a good though local population, some evidence to the effect that the plants might seed into heavily mechanically disturbed sites. However, no specimens have ever been observed in contiguous drained areas.

References

- Small, J. K. 1933. Manual of the southeastern flora, pp. 777-779. Chapel Hill, N.C.
- Webster, G. L. 1970. A revision of Phyllanthus (Euphorbiaceae) in the continental United States. Brittonia 22: 44-76.

SPECIES: #54 Phyllanthus liebmannianus Muell. Arg. ssp. platylepis (Small)
 Webster Leaf flower

Expected* Effect on the Species	Management Practices							
	Prescribe Burn	Bulldoze or Root Rake	Bed	Chop	Thin over- story	Cut Over- story	Establish Plantation	Graze
Destroy		?	X	X				
Damage						X		
No Lasting Effect	NA							Poisonous
Beneficial if Done Properly					X			

Other Comments:

*Expected effect on the species is an estimate made by Dr. Robert Kral based on his knowledge of the habitat and on knowledge gained from personal field observations. Estimates are "rough" in many instances. Results of practices may be modified depending upon the degree of application, intensity of treatment, nearness to plant communities, etc. A management practice for which no entry is made indicates a lack of sufficient information from which to predict expected results. As observations are made in the field by users of the data, the expected effect will be refined.

Phyllanthus liebmannianus Muell.-Arg.
ssp. platylepis (Small) Webster



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